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VETERINARY MEDICINE

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D. M. Campbell, Editor **A. T. Kinsley, Associate Editor**

Coccidiosis in chickens is quite prevalent in some sections. According to Gildon of the New Hampshire Experiment Station, this parasite may persist in the soil for from one to two years.

"Lacto-acidophilus" is the name applied to an acidophilus milk to which is added various fruit juices and then the compound is frozen. This product has the flavor of a sherbert. This product is a medicated delicacy that will be of value to those individuals that harbor putrefactive bacteria and dislike the flavor of acidophilus milk.

The use of live culture vaccine in the control of abortion disease in infected herds of cattle does not diminish the breeding efficiency and thus disappears one of the objections to the use of this product. According to the report of the veterinary division of the California Station, the vaccination of cows with the live virulent culture will confer resistance for at least three gestation periods.—*Exp. Sta.* 59-8.

Because of the supposed deleterious effects of copper on powdered and condensed milk, manufacturers have resorted to the use of other than copper in the construction of vacuum pans. According to recent investigations it appears that the increased copper content of milk powder, due to the solvent action of the milk on the copper vacuum pan, is beneficial rather than injurious. —*Dairy Science,* 12-1.

Dairy cows spend approximately 50% of the time lying down. Approximately five pounds of water is consumed for each pound of milk produced.

Entropion, according to L. V. Skidmore, is relatively common in lambs. The doctor believes that there is an inherited structural anomaly. Others attribute it to a dietary deficiency.

Chronic inflammation increases the permeability of vascular endothelium and epithelial cells and thus removing the barriers that prohibit cell multiplication favor cancer development.

Copper sulphate in 1% solution is generally recommended in the treatment of sheep and goats infested with stomach worms. According to Schmidt and Black (Texas) a 2% solution of copper sulphate can be administered without danger and is probably more effective than the 1% solution—*Exp. Sta. Rec.* 59-8.

The rabbit industry is rapidly developing in this country. Like any other branch of animal industry, the successful breeding and rearing of rabbits is dependent upon proper care, including housing, feeding, management and prevention of disease. Rabbits are subject to various parasitic and bacterial diseases. Veterinarians should familiarize themselves with the care and treatment of rabbits.

FOOT AND MOUTH DISEASE MAKES A CALL

FOR the ninth time foot-and-mouth disease has appeared in this country. The recent outbreak first appeared January 18, among 3,500 hogs in a swine feeding plant at Whittier, Los Angeles County, California. Previous visitations of this malady in this country were in 1870, 1880, 1884, 1902, 1908, 1914-1915 and in 1924 when there were two unrelated outbreaks.

Of course, any and every appearance of foot-and-mouth disease among the live stock of the country is serious, but a spirit of optimism as to the early suppression of this latest outbreak prevails. It was discovered early, and it was possible to bring to the control forces within a few hours, 50 municipal, county, state and Federal veterinarians all experienced in fighting the disease during the outbreak in California in 1924.

At this writing the disease has appeared on four premises, all within eight miles of the hog ranch where it was first discovered. All susceptible animals on these premises have been killed and buried and thorough disinfection carried out. Dr. Rudolph Snyder is in charge of the Federal forces and Hon. Geo. H. Hecke, Director of Agriculture is in charge for California.

The calmness with which the live stock industry has received the news of the outbreak of this, the most contagious disease of animals or man is a high compliment to the regulatory forces and an evidence of the confidence reposed in them. The infection in this instance like that in the California outbreak of 1924 is believed to have come from garbage taken off a ship that had called at a foreign port where foot-and-mouth disease is enzootic.

Some years ago the number of dogs licensed in Chicago was 88,000. In 1927, it was 36,000. The License fee is $3.00.—**Dog World.**

MYRON H. REYNOLDS

Dr. M. H. Reynolds, St. Paul, Minnesota, died at his home January 15, 1929, of pneumonia after an illness lasting six weeks.

Doctor Reynolds entered the Iowa State College in 1883 and thereafter until 1893, when he went to the University of Minnesota as Professor of Veterinary Science he was almost continuously in school, taking the degrees of B. S. A., D. V. M., M. D. and Ph. D.

Doctor Reynolds was long active in farmer institute work, was the author of the live stock sanitary law in Minnesota and for many years, executive secretary of the Minnesota Live Stock Sanitary Board. He was the author of many Agricultural Experiment Station bulletins and articles in the livestock and farm press, and also of a text book on veterinary science for agricultural students.

He was always an active worker in veterinary associations and for many years, was chairman of important committees in the Minnesota, Missouri Valley and American Veterinary Medical Associations. His committee reports and papers delivered at veterinary associations yearly for more than a score of years, were noted for the infinite labor expended on them, and for their comprehensiveness.

During recent years, his chief association interest was in promoting a higher appreciation of the veterinary profession on the part of agriculture. He was chairman of the Committee on Publicity of the Minnesota Veterinary Medical Society at the time of his death. He lacked but a few months of having completed 40 years of unusual activity in the veterinary profession.

Doctor Reynolds is survived by his widow, two sons and two daughters.

CORRECTION

The Tunnicliff referred to on page 45 of the February issue of VETERINARY MEDICINE, should be Ruth Tunnicliff, of the John McCormick Institute of Infectious Diseases, Chicago, instead of E. A. Tunnicliff as given.

Control of Contagious Abortion in Cattle*

By V. S. LARSON, Madison, Wisconsin

ADEQUATE control measures for the Bang abortion disease of cattle were delayed many years due to lack of a practical and efficient diagnostic agent.

Our laboratory men have devoted much time in research work, the most of which has been an attempt to develop an effective treatment, or cure for the disease and failing in this directed their attention to finding a means of establishing an immunity in susceptible animals. After years of faithful work much valuable information was given us concerning the Bang disease, but no efficient means of combating the disease has been offered. Their efforts were then directed toward developing a reliable diagnostic agent.

Many years ago the complement fixation test was employed to diagnose this disease with very satisfactory results when applied by a trained laboratory technician but was too complicated for the practicing veterinarian to use, and the cost of the equipment necessary to make such a test made it prohibitive. Later the slow or tube method agglutination test was used in testing for the abortion disease, and while this proved to be a reasonably accurate test a considerable time was required to make such a test and like the complement fixation test, was not practical for the average practitioner to use in field work.

It was not until about three years ago that a test known as the rapid method agglutination test was developed. To make this test, but little equipment is necessary and the technic is not complicated. Good judgment, however, is required in reading the results of the test though this may readily be acquired with the assistance of some one experienced in this work.

*Presented at the 14th Annual Meeting of the Wisconsin Veterinary Medicine Association, Madison, Jan. 16-18, 1928.

Control Like Tuberculosis Control

The control of contagious abortion may well be compared to the eradication of bovine tuberculosis. Our first efforts along this line were made in the late 90's when Dean Russell of the College of Agriculture returned from Europe bringing with him a supply of tuberculin with which he tuberculin tested the herd of cattle at the University, the first cattle ever tuberculin tested in Wisconsin. A number of animals in this herd reacted to the test and these were used to demonstrate the efficiency of the test. Following this a considerable amount of tuberculin testing of herds was done for many years during which time the accredited herd system was developed, but the eradication of this disease on a large scale was not possible due to lack of a practical diagnostic method. The Subcutaneous test for tuberculosis, like the complement-fixation test for abortion, was accurate but required too much time to be used on a large scale.

The advent of the intradermic test, however, solved the problem of tuberculosis eradication. With the aid of this diagnostic agent it was possible for a veterinarian to test a large number of cattle within a given time; which has resulted in the almost complete eradication of this disease from Wisconsin cattle. I believe that the development of the rapid method agglutination test will mean the same to the control of abortion disease in cattle as did the intradermic tuberculin test to the eradication of bovine tuberculosis. The test is reasonably accurate and is simple enough to permit the testing of large numbers of cattle by a practitioner with a minimum of effort and at a reasonable cost to the owner.

With such a diagnostic agent it becomes possible to establish practical plans for the

control of abortion disease and for several months past, the State Department of Agriculture have been working in cooperation with veterinarians and county agricultural agents in an attempt to start this work and judging from interest manifested by cattle owners, veterinarians and breed organizations, it is apparent that the public is anxiously awaiting assistance along this line. We find that a large majority of cattle owners, including some veterinarians, in seeking relief from this disease have resorted to the use of proprietary remedies, or commercial mineral feeds which we all know have no value as far as the prevention or cure of abortion disease is concerned. Some argue in defense of the feeding of mineral feeds, that it will prevent nutritional abortions. The fact remains, however, that nutritional abortion rarely if ever occurs except experimentally. We still find many cattle owners who are depending on the virtues of a billy goat for protection.

Educational Program a Simple Matter

I believe that we will experience but little difficulty in educating the public to the idea of adopting a practical and sane plan for the control of contagious abortion. In discussing this project with cattle owners we are often asked this question, "What have you got that will cure contagious abortion?" We reply that we have nothing to offer as a cure for this disease, neither have we a cure to offer for bovine tuberculosis, and yet in the face of such a handicap we have practically eradicated that disease from the state. And we are convinced that with the aid of the rapid method agglutination test for abortion, which compares favorably with the intradermic test for tuberculosis it is possible to accomplish the same results in our fight against the abortion disease.

Plan of Control

The plan outlined for the control of the abortion disease by the State Department of Agriculture consists in the blood testing of all cattle in a herd that are sexually mature, including bulls. In the event the herd is found negative to this test, the herd should be retested at regular intervals with a view of protecting it against the invasion of the infection of the Bang disease, the same as we retest cattle for tuberculosis to protect them against the invasion of that disease; or rather to make early discovery of the invasion. In fact it seems more logical to make a small investment at regular intervals to guard against losses resulting from the abortion infection than from losses due to tubercular infection due to the far greater losses resulting from abortion disease. All additions to a herd should be blood tested and unless from a herd that is entirely negative to the abortion test should be retested in from 30 to 60 days before becoming a part of the regular herd. The herd sire in a negative herd should only be used for service on cattle that are free from abortion as revealed by the test. Young cattle should not be pastured in a public pasture in common with other cattle that may be carriers of the infection. Also, a negative herd should not be permitted to associate with an infected herd even through a line fence, as the practice of cattle licking each other may prove a fertile source of infection. These are only a few suggestions to prevent the introduction of infection into a herd not diseased.

If, however, when a herd has been tested a small amount of infection is disclosed, say not to exceed 30%, the reactors should be isolated and all low producing cows, difficult breeders and those having defective udders should be sold for butchering purposes. Other reactors that are good breeders and producers but have established a tolerance to the disease should not be slaughtered as they would be valuable in an highly infected herd where additional cattle are needed, as they could not be affected by being exposed to infection nor could they do harm. After the removal of reactors the premises should be disinfected and the non-reacting cattle retested not later than every 90 days until two negative tests have been passed after which the tests may be made less frequently, possibly at six months or yearly intervals. The herds should then be handled as described for a non-infected herd.

The herds in these two classes are not

difficult to handle and maintain negative to the abortion test but the third class, the one in which a high percentage of infection is found presents the real problem. Such a herd must be considered as being 100% infected as it is not practical to attempt the establishing of a negative herd with such a foundation due to the large number of reactors that will be disclosed to retests. In order to reduce the losses due to abortions in such a herd we believe the use of the vaccine or live culture is justified providing it is used only on open cows and virgin heifers that are sexually mature. The owner should always be advised, however, that cattle so treated will become reactors to the blood test, though we have no data to indicate the length of time such cattle will continue to react. All additions to this herd if negative to the test should be treated in the same way.

It has been found by actual experience that a negative herd may be built up with calves raised from infected breeding stock providing the calves are separated from the infected herd before they become sexually mature, say at about six or seven months of age and are not again exposed to infection. They must be pastured separately during the summer months and stabled separately during the winter months. We realize there are few farmers that have stabling facilities for two herds of cattle but the expense of erecting sheds of cheap lumber suitable for this purpose, will not be great when compared to the value the project will have in establishing an abortion negative herd. Undoubtedly, some of the old infected herd will in time recover from the disease and cease to react. If they remain negative during an entire period of gestation they would be safe to associate with negative cattle without danger of spreading the disease. As soon as a sufficient number of heifers have been raised to replace all positive reactors in the herd, the reactors may be disposed of properly and the herd handled as an abortion negative herd.

In abortion control work it must be borne in mind that all abortions are not caused by the Bang organism. Some authorities estimate that about 85 per cent. of abortions are due to this organism, the balance being due to other forms of infection or accidents. Abortions due to causes other than the Bang organism will not react to the blood test and when such cases are encountered it is advisable to put forth an effort to determine if possible the cause of the trouble. Dr. Herbert Lothe[1] presented a valuable paper on this phase of abortion control at the meeting of the A. V. M. A. at Minneapolis last August, which is worthy of careful study by every veterinarian.

Must Be Handled by Veterinary Practitioners

To successfully combat the cattle abortion disease as a state wide project will require the full cooperation of every graduate veterinarian in Wisconsin, and also the cooperation of all county agricultural agents, officials of breed organizations and cattle owners.

In our fight against bovine tuberculosis it was found practical to use veterinarians employed by the public to carry on the work, but in our efforts to control abortion disease this plan will not prove practical due to the fact that the many disorders and breeding problems incidental to this disease must be handled by a qualified veterinarian who is available any time his services may be needed. It, therefore, appears logical that he should be expected to render all professional services necessary in carrying out this control program. It will be necessary, however, in order to correlate the work in all parts of the state that a uniform plan of carrying on the work be adopted and maintained, that only veterinarians whose ability and integrity are unquestioned be permitted to participate in the work and that a uniform scale of prices be charged for services rendered that will be in keeping with the value the project has to the cattle owner and at the same time keeping in mind the technical nawork.

[1] Veterinary Medicine Vol. XIII No. 9 (Sept., 1928) p. 388.

ture of the service so that the veterinarian may be properly reimbursed for his

In organizing this control project, we have decided to work through the practicing veterinarians and also the County Agricultural Agents who are well trained in organizing and promoting a project, they have all shown a splendid spirit of co-operation by staging a series of institute meetings in their counties lasting from one to two weeks at which a representative of the State Department appears and explains to the cattle owners our plan of abortion control. These meetings have been very well attended and at every place a large number of cattle owners express a desire to have their cattle blood tested and follow our suggestions in abortion control.

While in the community we always offer to assist the veterinarians practicing there to get properly equipped and instructed so as to be able to make the rapid method agglutination test. We always recommend, however, that a veterinarian have his testing properly checked for a time by sending duplicate samples of the blood sera to a commercial laboratory or the College of Agriculture, and in the event he does not get the same results as obtained in the laboratory he must determine the reason. I find that the majority of practicing veterinarians are able with a little experience to make very satisfactory tests. If a veterinarian should not care to make the tests himself there would be no objection to having the work done in a laboratory.

There are at this time many states and foreign countries that realize the dangers that they are in, in exposing their cattle population to infectious abortion and in order to protect themselves against the invasion of this disease have adopted regulations prohibiting the introduction of cattle unless they are negative to the abortion test. It is not uncommon in some sections for veterinarians to be asked to test a carload of cattle for contagious abortion that are intended for interstate shipment. I believe every approved veterinarian in Wisconsin should be in a position to render this service when it is requested, as well as to do the tuberculin testing. It not only adds to the service we are able to render the public but increases the veterinarian's prestige in his community, and last but not least, it provides an added source of income which the majority of us can not afford to overlook.

It is quite evident that the control of the Bang disease has reached the stage where it may be promoted as a regulatory measure, having passed the stage of research or extension work. Our research laboratories have demonstrated to us that:

1. There is no cure or treatment of any value for this disease.

2. There is no effective means of establishing an immunity without making reactors to the blood test of the cattle treated.

3. The feeding of minerals, or feeds high in mineral content have no bearing on the susceptibility of cattle to abortion infection.

4. Calves raised from infected breeding stock will be in most instances immune to the abortion disease until they became sexually mature and if they are negative to the abortion test at that time and not again exposed to infection will remain negative to that test.

In addition to this they have developed a practical diagnostic agent that is reasonably accurate and it appears that it is now the duty of regulatory officials and practicing veterinarians to make use of this information in the control and permanent eradication of this disease.

Our research laboratories will no doubt continue their work in an attempt to further solve our problems and we as regulatory officials and practicing veterinarians will do our part in applying this information in a practical way. With this co-operation there remains no doubt in my mind that the work we have undertaken will result in the complete control of this, the most dreaded of all diseases menacing the cattle industry.

THE RAPID METHOD OF PERFORMING THE AGGLUTINATION TEST

Apparatus Required

1. Wooden box or cardboard carton of the following dimensions:

Over all outside length....13½ inches
Over all outside width..... 7 inches
Over all outside height.... 7 inches

2. A square opening is cut in the top of the box. This opening is about 5½ inches square. The bottom of the box is completely removed to allow an electric light bulb and socket to be placed directly under the opening.

3. A glass plate, about 6 inches square, is used over the opening. This is for the serum and antigen mixture. This may be held in place over the opening by glueing strips of cardboard parallel to the 4 sides of the opening and about ⅝ of an inch from the edge of the opening. Larger or smaller models may be used. However, this is a very convenient size for testing 8 different samples of sera at the same time.

4. Additional equipment consists of an electric light socket, made so that when placed on a table, it will hold an electric light bulb in an upright position.

5. An electric light bulb of 25 to 45 watts will give ample light and heat for conducting the test.

6. A nest of beakers 50 cc. to 200 cc. to hold saline solution (0.85%) for washing pipettes.

7. Several Erlenmeyer flasks 50 cc. to 200 cc. for antigen containers.

8. One or more 1 cc. pipettes graduated in 0.1 cc. and 0.01 cc. for the antigen.

9. One or more 0.1 cc. pipettes graduated in 0.01 cc. for the serum. It is well to have several pipettes on hand in case of breakage.

Method of Performing the Test

Starting on the left side of the glass plate, which rests on the box over the electric light, 4 separate drops of serum, 0.02 cc., 0.01 cc., 0.005 cc., and 0.002 cc. in amount are placed in a line on the plate with the 0.01 cc. pipette.

When the number of samples of serum to be tested have been placed on the plate, 0.04 cc. of antigen or test fluid is added to each drop of serum. This is approximately one drop from a 1 cc. pipette.

The two fluids are then well mixed with a toothpick. Care should be taken to start mixing with the drop containing the smallest amount of serum, that is the highest dilution, and mix the drops progressively to the lowest dilution or the drop containing the largest amount of serum. The end of the toothpick should then be broken off before passing to the next sample of serum, this will prevent two different sera from coming in contact with each other.

When all samples are mixed, the plate should be gently agitated to facilitate agglutination or clumping and also reading the reaction. Heating gently over a flame will apparently hasten the agglutination. The clumping of the bacteria in these samples which are positive is readily observed.

The next and last step is reading the test. Not more than three minutes is necessary for agglutination to take place if the reaction is positive, so it is safe to read and note down what has taken place at that time. Too early reading may cause the slower reactions to be missed or overlooked by the operator and a later reading may be clouded by the mixture drying out with the formation of salt crystals.

The antigen or test fluid is a very heavy suspension of bacteria in a 12% salt solution to which 0.5% carbolic acid has been added as a preservative. This makes a very milky, opaque fluid.

A negative reaction is one in which the drop mixture remains cloudy throughout the test and looks the same as the drop of antigen when placed on the plate.

A positive reaction is one in which the organisms clump together as granules or flocculi, with the surrounding liquid becoming either totally or partially clear and translucent. These clumps may appear either large or small, but in either case, denote the presence of abortion antibodies in the serum.

It is essential to restrain the animal for drawing the blood. The stanchion and Iowa bull tongs serve very well for this purpose. To raise the vein use a section of sash cord with a ring on one end. A 1-inch, 16-gauge needle is about the right size. It should be very sharp and inserted at one stroke. Samples of blood can be drawn at the rate of one per minute.

LOSS OF SHEEP

Will some reader of VETERINARY MEDICINE outline the method of handling and treating the following:

About 6,000 sheep from southern Texas are now located about 400 miles west of Kansas City. These sheep are mostly ewes two to three years of age, were gaining and thrifty until about the middle of December, when some were noted to be unthrifty and several died. By the middle of January about 300 were dead. An investigation was made at this time and the following conditions found: Stomach worms were very prevalent, esophagostomiasis; *Oestris ovis* quite prevalent in several, *Taenia fimbriata* and some lesions of hemorrhagic septicemia.

These sheep are on good range and the weaker ones are being fed on cottoncake, ¼ pound daily, and a small quantity of shelled corn.

What medication should be given to diminish the ravages of the stomach worm? What value would Fowler's solution be administered on the feed?

Abortion Disease of Cattle *

By A. T. KINSLEY, Kansas City, Missouri

ABORTION disease of cattle is a specific infectious disease, characterized by the following in the cow: abortion, metritis, retained placenta, sterility, mammitis and by scour and pneumonia in calves. This disease has been variously designated as "contagious abortion," "slinking of calf," etc., however, those names imply the expulsion of an immature calf which is only one manifestation of the malady and therefore abortion disease is a more desirable name.

This disease has prevailed for many years. In 1567 Mascal reported that from 50 to 60 per cent of cows aborted in certain localities in England. The disease was widespread in Denmark during the latter part of the last century. Bang, a Dane, isolated the causative microbe of abortion disease in cattle in 1896 or 1897. Sir John McFaydean made a comprehensive report in 1909 of abortion disease in England in which the widespread nature of the disease was noted. Twenty years ago various investigators and disease control officials estimated the annual loss to the cattle industry in the United States approximated $20,000,000. Recently, it has been estimated that the annual loss incident to this malady is at least $50,000,000. The economic importance of this disease is not fully appreciated by cattle breeders and veterinarians. In one state the annual loss to the dairy industry alone has been estimated at $3,500,000.00. One purebred beef herd was investigated in which there was less than a 50 per cent calf crop because of the ravages of this malady. It was not possible to estimate the loss in this herd; however, it may be of interest to state that there were over 300 breeding cows in this herd and individual bulls had been sold from it for as much as $20,000. One purebred dairy in which there were over 800 cows produced less than 400 calves annually. Many of the cows in this herd were imported, some of them at a cost of $10,000. Numerous instances could be reported of herds, both dairy and beef, in which the average calf crop is less than 50 per cent.

Abortion disease in cattle occurs in every state and probably in every foreign country in which cattle breeding is practiced. For many years it appears from reports that abortion disease was especially prevalent in the intensive dairying sections and primarily affected dairy cattle; however, in recent years the malady has invaded not only small beef herds in the grain belt but also many of the large cow herds on the range. It is evident that the disease is widespread and the usual herds, either dairy or beef, that are free from abortion disease are not very plentiful.

The specific cause of abortion disease is the *Alcaligines abortus* (Bang). This micro-organism was formerly designated *B. abortus* (Bang). It should be understood that expulsion of a premature calf may be caused by other than the *Alcaligines abortus*. This organism may retain vitality for a considerable period of time outside the animal body if protected from sunshine and not dessicated. It is destroyed in milk by pasteurization. The percentage of aborting cows in a herd and the rate of spread of the disease in a herd may be due to varying pathogenicity of the infecting microbe, variation of the susceptibility of the exposed cattle and the management of the affected herd. No doubt, predisposing influences, such as improper or insufficient feed and rough handling, are factors in the occurrence of abortion disease.

The channel of entrance of the causative germ of abortion disease is primarily by way of the mouth, either in feed or water. It is possible that infection may be introduced direct into the genital tract during service; however, only a relatively small percentage of cows are infected in this manner. Other than the digestive and genito-

* Read at the annual meeting of the Oklahoma Veterinary Medical Ass'n, Oklahoma, Jan. 14-15, 1929.

urinary canals, infection may be introduced into the teat of the cow.

There is apparently a predilection of the microbe of abortion disease for the gravid uterus. The organism may also be found in the mammary gland. Uterine infection with the *A. abortus* can apparently occur at any time during the gestation period. It is also of interest to note that the uterus becomes free of the infection in from 30 to 40 days after abortion or calving.

Mammary infection is significant because of the spread of the infection through the milk, which may thus imperil the health of man and animals. According to some investigators, over 30 per cent of cows that give a positive serological reaction eliminate the abortion microbe in the milk, not continuously in most instances, but some time during the lactation period. Abortion disease is insidious and the period of incubation appears to vary from a few weeks to several months.

The *A. abortus* is disseminated in uterine discharges and in milk of infected cows. Feed and water in feed lots or pastures may thus become contaminated. Thus, the affected cow is the primary source of abortion infection, and it is probable that over 95 per cent of infected herds have been infected by the introduction of a diseased cow. It should not be implied that the bull should be disregarded as a source of abortion disease; however, he is, according to most investigators, a minor factor. Abortion disease is a chronic malady and often it is not possible to trace the infection.

Heifers are apparently more susceptible to the abortion infection than are mature cows. Thus, it is common knowledge that there is a larger per cent of first calf abortions than there is of the second or third pregnancy. Affected cows do not continue to abort. In fact, over 50 per cent may abort once, less than 25 per cent abort a second time and only a small percentage will abort a third time. In other words, there is an apparent immunity developed in an infected herd against abortion disease. This should be given proper consideration in the control of abortion disease.

The serologic test is the most reliable method for the diagnosis of abortion disease. This test should be done by some competent laboratory technician and, although quite reliable, it is not infallible.

The control and prevention of abortion disease is one of the most difficult problems confronting the veterinary profession. Foot and mouth disease has been eradicated from this country eight times and pleuro-pneumonia once by the so-called slaughter method and tuberculosis is being reduced by this same method. Nothing is impossible; however, because of the extent of abortion disease in the cattle herds in this country, the cost of applying the slaughter method would be tremendous. A system of maintaining an abortion disease free herd and an abortion disease infected herd has been suggested and is being carried out on a small scale. This method of control is dependent upon repeated serological tests, and the provision of a double set of improvements thus entailing an enormous expense.

Conditions under which cattle are maintained are quite variable in different sections of the country. Thus, methods of control of a 20-cow dairy herd would probably be quite different than control methods in a 1,000-cow range herd. Another very important factor that must be given consideration in abortion disease control, particularly in dairy herds, is the fact that the *A. abortus* is capable of infecting the human, and numerous cases of undulant fever have been traced to it.

The control of abortion disease by sanitary officials is being given serious consideration. North Carolina, South Carolina, Georgia and Arkansas require all breeding and dairy cattle that are shipped into those states be accompanied by a chart showing that they have given a negative serologic reaction. This requirement is apparently premature for two reasons: first, abortion disease prevails in each of the four states and there is no requirement that herds into which imported cattle are introduced shall have been tested and found to be abortion disease free. Thus, the negative reacting cattle are invariably susceptible and, if intro-

duced into infected herds, become infected. Negative reacting cows should not be introduced into infected herds. Second, the serologic test is not absolute and it is not unusual to obtain a negative reaction from an infected cow for from two to four weeks after abortion, thus a negative reacting cow may be infected and disseminating the infection and thus infect a herd into which she is introduced.

The public health problem relative to the occurrence of the *A. abortus* in milk can be solved only by the universal pasteurization of milk.

It is possible to build up an abortion disease free herd and maintain it on farms where but few cows are kept, but it does not seem to be a feasible plan to be universally adopted. It is also possible to establish a herd of average breeding efficiency by the selection of cows that have aborted, and obtained an immunity, but because of the occasional carrier a large percentage of first calf heifers would become infected and abort.

The successful control of any disease is dependent upon the adoption of a method or combination of methods that are practical and financially justifiable. In the control of hog cholera it has been found that sanitation and vaccination suffice. Although hog cholera is an acute fatal malady and abortion disease is a chronic relatively non-fatal disease, the two diseases have one common factor; namely, the apparent constant prevalence and universal distribution of the infecting agent.

The following general plan for the control of abortion disease in infected herds is suggested:

1. Verify field diagnosis by serologic test.

2. Inject all pregnant animals from one to six times with sufficient dosage of abortion bacterin. It is recognized that many investigators have condemned abortion bacterin as a product of no value; however, numerous instances can be cited where abortions, retained placenta, metritis and mastitis have practically disappeared after the use of this product.

3. Inject all heifers that are to be bred and all open cows with one injection of the live culture vaccine. Animals injected with abortion vaccine should not be bred for sixty days after the vaccination.

There may be those that will question the use of an abortion vaccine because of the possibility of establishing carriers. In this relation the following quotation from Technical Bulletin No. 43, University of Minnesota, will be of interest:

"The use of living vaccine did not increase the number of animals which eliminate *B. abortus* Bang. We have been unable to demonstrate that vaccination retards conception or that increased sterility is directly associated with the use of the living vaccine."

From Bulletin No. 304, Ontario Veterinary College:

"The use of the living culture vaccine is indicated in badly affected herds for the purpose of establishing herd immunity. It should be administered to all the non-pregnant cows and heifers in the herd two months before they are bred. . . . If an animal is properly immunized by this method for two successive pregnancies by repeating the vaccination after calving, there is little danger of the animal thus treated aborting afterwards."

From Bulletin No. 368, University of Wisconsin: "Our study of contagious abortion vaccine shows that it has a decided immunizing value, especially for cattle of certain groups. The vaccinated cattle showed a decrease in both the abortion rate and the sterility rate which resulted in an increase in the breeding efficiency in the treated over the untreated animals. This was particularly marked in the second gestation period."

4. Aborting cows should be isolated for sixty days after abortion. This can be accomplished on the small farm, but is not practical under range conditions.

This method will not produce 100 per cent results but, if conscientiously followed, will result in a material increase of the calf crop in those herds in which abortion disease is prevalent. There will also be a reduction in the number of cases of metritis, mastitis and scour and pneumonia in calves.

Infectious Abortion of Cows*

By S. L. STEWART, Olathe, Kansas

INFECTIOUS abortion is of much greater importance to the dairy industry of this county (Johnson County, Kansas) than tuberculosis. Less than 1% of the dairy cows in this county reacted to the tuberculin test in 1928; but infectious abortion is very common, and with a high percentage of abortions in affected herds.

Infectious abortion in dairy herds exacts a heavy financial loss annually. First, the loss of the calf, and if it should be from a high-bred or registered cow, the loss of a calf is truly heavy. Second, the loss of milk production is a greater financial loss, as the cow usually aborts some weeks before the proper time for her to give birth to a normal live calf, in some cases, extending her milk period as long as two or three years before she gives birth to a normal live calf; or she becomes sterile from secondary causes and, after numerous attempts to breed her, she must be sold on the public market for what she will bring. Third, complications and sterility create a heavy follow-up loss.

As the production of milk increases or decreases the dairyman's bank account fluctuates accordingly, and this may well apply in any section of the country where the dairy industry is well developed or in the stage of development.

Infectious abortion is an unusually expensive disease to the cattle industry and if allowed to continue in a herd it will eventually put any dairyman or cattleman out of the dairy or cattle business.

The following data, based on work extending over a period of eleven years, is quoted from a recent bulletin of the Storrs Agricultural Experiment Station:

"The present data cover the eleven years from 1914 to 1924, inclusive. The herd averaged 30 cows in milk per year, constituted in the proportion of 16 abortion reactors and 14 non-reactors. The non-reactors each returned above feed cost, $28.41 more annually in value of milk (at 7½ cents per quart or $3.51 per cwt.) than the reactors. The total loss in product for the 11 years was $5,000.16.

"During this period fifty-nine reacting cows sold brought an average per cow of $35.26 less than thirty-seven non-reactors. This represents a total depreciation of $2,086.24, due to abortion infection.

"There were thirty-two more calves lost in the reacting group than in the non-reacting, representing a loss of $20.59 per calf and a total loss of $658.88."

These three losses among the reactors—namely, income from product, loss of calves and depreciation of cows—amounted to a total loss of $7,745.28 for the eleven-year period.

Dairymen are, as a rule, in a state of confusion regarding treatment for infectious abortion. Frequently they adopt the elimination or let-it-go method, some prefer to stick with the problem until it is too late, and then frequently quit the dairy business.

Two weeks ago a young man came to my office to see me regarding infectious abortion in his herd. He had 16 cows and only one live calf. The milk production had decreased until the income would not pay the expense of feeding the cows. This young man had followed the advice of friends who told him that the cows would become immune and that he could save a big veterinary bill by letting the disease run its course. He adopted the plan of let-it-go. Now he is going out of the dairy business because his income will not pay the expenses of operation.

Two years ago a man who owned a herd of 27 high-grade jersey cows said that he treated his herd with some abortion remedies that were highly advertised. After treating them until he was disgusted, he then wrote to the college at Manhattan for advice. The answer from the college recom-

* Read at the 25th annual meeting of the Kansas Veterinary Medical Association, Topeka, Jan. 9 and 10, 1929.

mended that he employ a veterinarian, and follow his advice. He was further told about the isolation method, vaccine treatment, and finally the disposal method was explained. The owner was so discouraged with treatment of fake remedies that he evidently had little faith left for veterinarians. He adopted the disposal method and sold 22 head on the Kansas City market, which brought him approximately $39.00 each. These cows in normal healthy condition were worth $150.00 per head for dairy purposes. He therefore lost $111.00 on each cow, or $1,221.00, on the 22 head. If each cow had netted the owner only 40c a day on milk, the 22 head would have netted $8.80 a day, or a total of $3,212.00 for one year on milk. Placing a value of $20.00 on each calf would amount to $440.00, plus the loss of $1,221 from the sale of the cows, makes a total loss of $4,873.00 in one year for this dairyman, caused by infectious abortion.

The Government has advocated the tuberculin test and eradication of tuberculosis and has expended large sums of money for this purpose. A vast amount of good has been accomplished and it is hoped that the work of tuberculosis eradication will continue, until such time as that disease is no more within our land. But I believe that the Government should also begin the work of eradication of infectious abortion. Government advocacy of such a plan would go far to influence cattlemen in general to treat affected herds. Then if the Government would spend as much money to advertise treatment for infected herds and eradication of infectious abortion as it has in hog cholera work and tuberculosis eradication, much more effective work could be done and a saving made of enormous sums of money for the cattle industry.

Regardless of the fact that thousands of cattle are treated every year for abortion and much benefit has been derived from treatment, we must concede the fact that infectious abortion is on the increase.

Diagnosis of infectious abortion cannot be positive without an agglutination test, as abortions may be caused also by vitamin or a mineral deficiency and by other causes. However, it has been found that some cows that are infected have a so-called negative phase for a time prior to and after aborting or calving, and will fail to react at that period. For two or three weeks following abortion or normal calving is the danger period of infecting other cows. At the same time it is thought that some reactors are not spreaders of the disease. These facts make a positive laboratory diagnosis somewhat uncertain, but more certain than any other method of diagnosis. Therefore every veterinarian should have the agglutination test made on abortion herds to confirm his diagnosis of infectious abortion.

When a diagnosis of infectious abortion is made, the client must be informed as to treatment, which in many instances is a complicated problem. First, the value of the cow or cows affected, or the value of the cows in the herd must be taken into consideration. Second, how long must abortion infected cows be kept before they will produce live calves and be profitable milk producers? Third, how shall they be treated? Fourth, what will the result be? Fifth, will it pay?

Answering the questions one at a time: First, if the herd is composed of scrub cows and poor milk producers they should be placed on the market at once, because they are a liability to the owner, and the quicker they are disposed of the better. Second, usually a cow that has aborted must be retained for a period of at least one year or until she produces a live calf before she is again a profitable milk producer. Third, the length of time the herd must be treated depends upon several things. If the infecting organisms are of a low virulency, one treatment may be sufficient; if the organisms are virulent, it may take several treatments, depending somewhat upon the method of treatment. Fourth, the results of treatment also depend upon several factors: the kind of treatment inaugurated and the method used in treating, also if new virulent infection is introduced into the herd at different times during and after treatment. Other angles no doubt should be mentioned, but these will suffice to give an insight into

the many problems that are met with in practice. Fifth, treatment properly used will pay several hundred per cent in well bred, high producing milk herds.

When we begin to talk treatment of infectious abortion, and face the fact that with all the treatment, so far used the disease is increasing rapidly, it is indeed discouraging. However, one is quite safe in saying that the infection spreads principally from herds that have received no treatment, and from reacting cows which have been sold promiscuously.

Treatment must be followed out in every instance in some systematic method that will give results, and even there our ideas change as time goes on, as discoveries are made and more is learned about treatment.

Abortion bacterin seems to give splendid results, as thousands of treatments are used every year and good results are reported from their use. Many veterinarians are enthusiastic for bacterins. Some have reported good results from one dose of bacterin. Others use the one-dose treatment and repeat in 60 to 90 days. Still others use the 3-dose treatment and repeat every 90 days until desired results are obtained.

In one herd treated with the 3-dose treatment of bacterin every 90 days over a period of about two years the results were not satisfactory, but a herd autogenous bacterin was made and administered in 3-dose treatment and repeated once and was entirely satisfactory.

Vaccine (live attenuated organisms), are used by many veterinarians and reports seem to indicate that it gives decidedly beneficial results if properly used. At least 15 experimental stations have made favorable reports regarding their experimental work on the use of vaccine, both as a curative and preventive measure. Some recommendations are that all breeding cows should be vaccinated with vaccine and serum. Here I prefer the abortion bacterin.

After these cows calve, vaccinate them with abortion vaccine alone, sixty days before re-breeding them. All open cows in the herd are to be vaccinated with abortion vaccine alone, and this also applies to all heifers which are to be bred within the next sixty to ninety days. The double treatment (vaccine and serum) is used only on pregnant animals, when you start the vaccinating program, and is not used again, unless a new cow is added to the herd. Then the follow-up treatment of vaccinating the heifers and open cows.

Dr. Ward Giltner has said that if vaccines in their present state of development are used, no further steps should be required, except that isolation, sex hygiene, or stable sanitation should be practiced at the time of calving and abortions, especially in order to prevent sterility and complications.

Quadruplet Calves—No Sterility Here.

It is known that cattle have a marked variation of susceptibility to invasion by abortion infection, and likewise the degree of immunity varies accordingly, and such variations are marked.

Dr. F. B. Hadley reports that vaccine has been 85.9 per cent effective in Wisconsin—some report as high as 94.2 per cent effective.

Mr. Faux, of Massachusetts, a dairyman of experience, has said, "I would not own an unvaccinated cow. If I had the choice of buying from two herds, one of which (A) claims he is never troubled with abortion, and the other (B) admits that he has had abortion, but that his herd is now vaccinated, I would buy from (B) and pay him a better price for cows of lower quality."

Infectious abortion can be as successfully

treated and controlled as most of the other diseases by local veterinarians in the field of actual practice, but the veterinarian must personally study the existing conditions, make physical examinations, obtain blood for serological tests, remove retained afterbirths, treat metritis, and mammitis, observe and care for other conditions that may be present or apt to arise later. But to cease such efforts after a few months treatment frequently proves a waste of time and money. Therefore, a continuous vigilance is required if success is to be obtained. Best results have been obtained in my practice, where Vitamineral has been given over a long period of time in conjunction with treatment.

In conclusion, it would be unfair to the subject of infectious abortion and to the veterinarians of this meeting at this time to close the subject without some remarks regarding undulant fever in man, a disease which is said to be caused by the baccilli of abortion obtained from drinking cows milk containing the organisms.

The symptoms of undulant fever are, temperature, usually ranging from 100 to 103 degrees, general muscular pain, stiff neck, pain in the eyes, nausea, headache, backache, constipation and in the female hemorrhage from the uterus. In other cases, profuse sweating, chills, fever, moderately high pulse rate. In still other cases, an enlarged spleen. The leukocyte count runs from about 3,000 to as high as 6,600. The duration of the disease is said to be from five to ten weeks; it is prone to re-occur over a long period and from this characteristic it gets its name.

There is an unusual stir about undulant fever among health officers in all large cities, and a number of cases have been reported. The Journal of Infectious Diseases is giving a great deal of space to the subject, and cases have been reported from Kansas City.

There is no cause for any unusual alarm regarding undulant fever. There are probably only a few more cases now than there have been in the past. Neither has it been definitely proved that abortion organism of Bang produces undulant fever, even though blood from people who have the disease reacts to the same agglutination test. However, we must concede the fact that indications point, that milk containing abortion organisms may cause undulant fever.

Veterinarians should not pass this up lightly, as Health Boards and sanitary officers are pushing this problem to the front and in my judgment a move toward eradication of infectious abortion will begin soon.

No longer ago than during the last week in December, the Milk Committee, which is composed of three veterinarians, was called by the Health Board into the Health Board office in Kansas City, and one of the things placed before the committee was the eradication of infectious abortion in cows producing milk for consumption in Kansas City.

We advised the Milk Commissioner that it is a task offering almost insurmountable difficulties. The reply was that eradication of tuberculosis also at one time seemingly offered insurmountable difficulties and is still so regarded in most countries, but is now a small item, and that we are now considering that in the very near future dairymen must produce certificates to show that their herds are free from infectious abortion; that the Health Board's business is to protect the health of the people in the city and that undulant fever due to milk borne infection must be prevented.

One dairyman is now taking advantage of the situation and advertising on each bottle, "This bottle of baby milk is from selected cows, in best lactation stage and of proper butterfat content for infants. The agglutination and complement fixation blood tests and the tuberculin test are applied semi-annually to the herd from which it comes."

It seems wise that veterinarians should begin to do some missionary work in their respective localities toward eradication of infectious abortion, as the time seems not far distant when a dairy cow, if sold to go into the dairy district and her milk sold in the big cities, must be accompanied with an infectious abortion free certificate as well as a tuberculosis free certificate.

Experiences in Feeding Vitamineral to Dairy Animals

By JOHN W. BROWN, Ft. Scott, Kansas

READERS of this article, I hope, can recall my article appearing in this journal some few years ago under the head of "Sterility of Dairy Animals." One of the points in that article was that a good mineral supplement, together with proper feeding and care of animals up to maturity, would reduce sterility in our dairy herds to a great extent.

Being a general practitioner in a dairy section, I have clung to this belief and I have convinced a large percentage of my clients. I have used a number of minerals and found all will do some good, providing the minerals are in a state capable of assimilation. As a result of my experience I have come to rely upon a dry yeast plus mineral. You ask why yeast plus mineral, as other good formulas can be purchased cheaper, and if any body need practice economy it is the veterinarian and his client.

In most cases of sterility the cause is abortion, and abortion is largely influenced by a weakened state of the animal which reduces its power to resist the ever-present infection, and my belief is that the dairy animals' systemic weakness is largely due to lack of minerals, especially calcium, phosphorus, and iodin. When we consider the successful dairy cow produces milk, what is, viewed physiologically, an abnormal, even pathological quantity of milk, about ten months in the year with heavy mineral content, and at the same time carries a fetus for nine months which requires a large amount of minerals. In addition to this, she must have enough mineral for her own body metabolism. Thus, she is an extremely large user of minerals. A little study of elementary agriculture shows us that our dairy industry is generally located in areas where the soil is largely exhausted and the amount of available minerals are lacking due to past products raised on the soil which matured, have been gathered and shipped to distant markets; thus this constant drain on the soil lessens its available minerals. Feeds raised on such lands are deficient in certain minerals and do not supply the abnormal quantity required by the high producing dairy cow.

To further complicate matters, breeders in the past have subordinated all other qualities to high production and too often have failed to breed a constitution into the dairy cow that is adequate to sustain the demands made upon her. What does a business man do when his income decreases, and his expenditures continue at the same level? He begins to unload to eliminate expenses for the things it seems he can most easily dispense with, without incapacitating himself. That is just about what a dairy cow does when her food is deficient in minerals, she discards the fetus, for it has been bred into her for generations to maintain a heavy flow of milk. Of course, she does not reason it out in that way, but what nature finally accomplishes is just that.

Thus my answer to this question is sanitation and minerals. Why yeast minerals? Because dry yeast helps assimilation, makes possible in paying quantities. Further, it is a stimulent to the gastric and intestinal juices; animals consume larger quantities of food and water with it than without it. It also furnishes vitamines that may be needed especially in winter months when sunshine is scarce. In short, it seems to give a "kick" to mineral absorption.

To cite a few of many instances that might be given to illustrate this: A client, owner of a registered herd in this locality, that I have worked for the last fifteen years, had some abortion. He has used minerals for the last four years and has seen the benefit from them, yet he was bothered with sterility, due mostly to cystic ovaries. On

rupturing the cysts and massaging, his cows would conceive, but their hair was never sleek, although housed in cold weather and given excellent feed. Eight months ago he changed to yeast mineral (Vitamineral) and for the past four months his animals have had sleeker coats than ever before and only one cow, so far, has failed to conceive and required ovarian massage.

Another client who had been in the dairy business for about three years and had one of the best dairy plants in the country became troubled with abortion in his cows and called on me for assistance. He had bought a number of good cows and when abortion appeared in his herd he vaccinated with live and killed vaccine and did everything his veterinarian prescribed, yet could not raise calves or get his cows on a paying milk basis. He bought other cows and had still more trouble. On learning from a neighbor of my partial success with abortion, he called to talk it over. He told me he had decided to sell or ship to market every hoof of cattle he had and start over with tested abortion free cows. I advised against it after hearing the history.

After careful inquiry into feed and care of the animals, I suggested that he bear with me for eight months. My explanation as to soil and so forth seemed to get under his hat and he said he would agree to anything, so my first lesson and job for him was sanitation, cleaning up the barn and keeping it clean, taking care of all discharge from animals. Instead of the bull running with the herd, he was separated and given an individual pasture and vitamineral in his feed twice a day. The cows were also fed vitamineral. He has used it about a year and he told me the other day he had lost only one calf. He has more calves than he ever expected, his animals are sleeker and in better shape than he ever expected and he is a firm believer in this feed. I could cite many cases of the successful use of dry yeast plus mineral.

I believe in a good mineral feed and, until convinced further, I believe the best results are derived from the yeast-mineral, but there is one drawback to yeast-mineral. You will not get half as many calls for impacted rumen in cows when fed yeast-mineral. A local business man told me a few days ago, "You have saved me on the average of ten dollars per month during the winter months since we began using that yeast-mineral on the farm," and he is right. I believe that the feeding of this yeast-mineral materially lessens the sickness and ailments of dairy cattle.

FEDERAL PROGRAM FOR STUDYING ABORTION DISEASE

A program of 14 points in investigations of infectious abortion of livestock was outlined by Dr. John R. Mohler, chief of the Bureau of Animal Industry, United States Department of Agriculture, before the abortion committee of the National Research Council.

The Bureau of Animal Industry is carrying on experiments and field investigations described as follows:

1. Experiments to determine the value of abortion vaccines.
2. The development of an improved vaccine safe to use even on pregnant animals.
3. Determination of the immunity afforded by vaccination.
4. The best age at which to vaccinate.
5. Determination, through field investigations, of the feasibility of combating the disease by eliminating or segregating affected animals, based upon the results of the agglutination tests.
6. Determining the practicability of developing a clean herd from an infected one by protecting the progeny from infection, and ascertaining the best method of handling herds to reduce losses while herd immunity is developing.
7. Determination of the best methods of limiting infection and reducing exposure in infected herds where more drastic means of control are impracticable.
8. Determining practical means of keeping abortion-free herds from becoming infected.
9. Studies to determine the part which other infections and factors play in the abortion problem.
10. Studies to determine whether deficiencies in certain vitamins and minerals tend to render animals more susceptible to infection with the abortion bacillus.
11. Determining whether there are other channels of infection than those commonly recognized, and their relative importance.
12. Studies of the reduction of milk flow of cows whose udders carry the abortion bacillus compared with cows that are abortion free.
13. Experiments in the elimination of udder infection.
14. Studies of the virulence and other characteristics of different strains of the abortion bacillus.

Shipping Fever in Cattle*

By F. B. YOUNG, Waukee, Iowa

THIS is not a specific disease but a combination of diseases occurring in cattle having been shipped recently from range and stockyards to feed lots to be fattened for market.

Most of the cattle shipped into Iowa for feeding purposes the last few years have been young, varying in age from short yearling calves to two year olds. These animals are rounded up on the range and in some instances driven long distances to shipping points. Then they go by rail to large market centers, where they are sorted and resorted, mixed with animals from other sources and even shipped to other markets when demand is dull. These animals, for the most part, come direct from pasture; some of the young ones may be just weaned, and are put on dry feed, which they are not accustomed to eating. Some bull calves are even castrated in the yards. By the time the farmer receives these animals at his feed lots, they have been through an ordeal that is enough to lower the resistance of any animal. The veterinarian, when called to see these animals, has no way of finding out how much of this ordeal they have been through.

The loss of a few animals from the lots of the average Iowa feeder is enough to take all of the profit out of the venture. This discourages him, so he goes out of the feeding business, which is very regrettable, as a load or two of feeders allows him something to do in the winter when he is not busy with other farm work. It also provides a means of turning his grain into desirable beef and supplies manure to fertilize his farm.

Symptoms

The symptoms usually noticed in this condition we are trying to describe are, anorexia, evidence of shock, weakness, wobbly gait, an inclination to stand away from the herd with the head down. Diarrhea and constipation may be noticed in the same herd. When affected animals are forced to move, they are stiff and often emit a grunting sound. Most of the animals may show a nasal dicharge if the weather is cold, but this in itself is not serious; they may cough. Watch for the ones with a dry, burnt-looking muzzle and observe them closely for rapid breathing.

Lesions

Upon postmortem examination we find a variety of conditions. The most common lesions are various types of pneumonia, edema of the larynx around the trachea, and of the lungs. Petechial and ecchymotic hemorrhages of the trachea, heart and the serous coats of the plural and abdominal cavities are common. Where diarrhea has been present it is not uncommon to find a severe hemorrhagic enteritis. The costal and abdominal muscles are often infiltrated with a straw-colored jelly-like exudate.

Treatment

The first thing to do with a herd showing any evidence of sickness during the first three weeks after arriving at the feed lots is to look after shelter and housing conditions. All animals should have plenty of shed room where they can get in out of cold rains and snow without being crowded. Prevent drafts, but be sure good ventilation is not destroyed, for animals must not be housed in close quarters where dampness collects on the walls and bedding. All sick animals should be separated from well ones. Often part of a hog house or a portion of the barn can be turned into a hospital to house the sick animals. If at all possible a chute should be built so as to make the handling of these animals as easy and safe as possible. Care and nursing of these sick animals will in many cases be well rewarded by results obtained.

In our hands, hypodermic medication of camphor in oil, and a solution of glucose in

* Presented at the 41st annual meeting of the Iowa Veterinary Medical Association, Des Moines, Jan. 22-25, 1929.

those animals showing depression has been rewarded with fair results. Large doses of salts are contra-indicated in most cases. Linseed oil, if carefully given, is the best cathartic to use if the animal is constipated. Intestinal antiseptics, such as copper arsinite, sulpho-carbolate compounds and salol, are used if diarrhea is present. Stimulants, such as nux vomica, ginger, and aromatic spirits of ammonia, are given in capsules. When the animal starts to eat and looks better, stop medication so as not to worry the animal too much.

We believe that aggressins are contra-indicated in sick herds and should be given only to vigorous animals where no evidence of fatigue exists. Hemorrhagic septicemia serum in our hands has not given any favorable results. Doses of stock bacterins of a mixed variety, given in large doses every other day, seem to be of some benefit in treating the sick animals. For your benefit, as well as the peace of mind of the owner, all animals in the exposed herd should receive a dose of mixed bacterin as early as possible after sickness is discovered or, better still, as soon as they arrive at destination. This dose should be repeated in all animals on the fifth day if they are still coming down with the disease.

This year we have used some of the new bacterins just placed on the market, which are supposed to contain an organism that possibly is the cause of the edema in the lungs. Our results have been favorable, but of course these have been experiments where there were no controls so they may not mean much. In our judgment the protein shock caused by injecting large numbers of dead organisms into an animal gives as much benefit as any specific antibodies that may be formed by their use. Do not depend upon biologic products entirely, look into housing of the well animals and feed. Segregate the sick and treat the symptoms as they are presented; many animals will be saved and they are worth that treatment at present prices.

Our advice to feeders is to avoid overcrowding, buy only what cattle can be well taken care of with the facilities at hand. If buying at stock yards, get someone to buy the cattle that knows the ropes and one that can tell fresh cattle from stale ones. Buy direct from range if possible. Ship in early if the price is favorable and get the benefit of good weather to get them started. Start cattle in right on light clean feed. Secure the services of a veterinarian and insist that he do more than push the needle in case of sickness in the herd.

TREATMENT OF TEAT FISTULAE*

I was called to see a splendid milk cow, which had just recently freshened and had been badly cut in a barbed wire fence. Her udder and teats were terribly lacerated, resembling hamburger steak as much as anything else. Three of the teats were badly torn, the milk canal being open and milk running out. The fourth teat was minus a strip of skin about an inch wide and two inches long that had been left hanging on a barb. Had the cow not so recently calved I would have recommended her slaughter, but on that account it was deemed best to do what we could towards repair.

The cow was cast, the area cleansed, trimmed and disinfected as well as possible and the openings into the milk canals were sutured with catgut. Next the skin was sutured with common interrupted linen sutures placed as close together as was thought necessary. Then with a teat bistoury a bold incision was made through the skin and the sphincter of each teat and iodin applied to the wounds.

The after treatment consisted in gentle washing and disinfection followed by the application of Oleum Pheno-Camphique. The owner was instructed to do what milking was necessary to keep the udder relieved of the milk, most of which drained out as it was secreted. However, if the ends of the teats closed somewhat it was a very easy matter to force the

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milk out due to the large openings which had been made.

The cow made an uninterrupted recovery, gave a good flow of milk during the entire season and is still producing. The special point of interest I wish to bring out in the above case is that of incising the end of the teat freely so there would be no need for severe pressure or manipulation of the teat while the wound was healing, and to show the safety of such a procedure as shown by the complete closure of the wounds and the complete restoration of function in the sphincter. I have followed this method on other cases in the past two years and the only bad results were in one case, in which the teat operated upon is inclined to throw a spray when milked. Hence I consider it very safe technic.

H. B. Treman.

Rockwell City, Iowa.

OBSTRUCTIONS IN THE TEAT CANAL*

I wish to call attention to a method of treating the so-called "spiders," the membrane that forms across the milk canal anywhere from the tip of the teat to the base. The following method may not be new to some of you but I have never seen it described in literature or never have seen an instrument on sale for the purpose. This method is not original with me. I am indebted to Dr. Heer of Plattsville, Wis., for the tip, which I put into practice at once after he described it to me five years ago.

The instrument I have is one I made myself from a human dental pick, it being small enough to enter the teat and also made of good steel so that considerable force may be exerted upon it. I prefer to cast the cow, although many times the work can be done in the standing position. After thoroughly disinfecting the end of the teat I insert a teat tube and break through the offending membrane as near the center as possible. I use the tube in order to be sure I have penetrated the milk chamber. When the milk flows freely I withdraw the tube and insert the instrument described just through the membrane. Then holding the teat firmly I force the blunt instrument to one side, thereby tearing the membrane as far as possible. This procedure is then repeated in any direction that seems indicated to break down the greatest amount of membrane without wounding the canal walls.

If I can succeed in making a large opening in the membrane without drawing any blood I feel that the result is nearly sure to be all that can be desired. If there is any amount of hemorrhage as a result of the operation, whatever method is used, proper after care is very essential. This consists in frequent milkings of a very small amount of milk at a time so that the milk chamber will always have some milk in it to dilute the blood. Only enough milk should be removed frequently to prevent the blood clotting in the canal. In case clotting does occur much massaging and stripping is needed to remove it.

H. B. Treman.

Rockwell City, Iowa.

* Presented at the 41st annual meeting of the Iowa Veterinary Medical Association, Des Moines, Jan. 22-25, 1929.

DO NOT COMBINE ANTHELMINTIC AND SERUM AND VIRUS TREATMENT

Is it safe or advisable, when handling suckling or small pigs, for serum and virus vaccination, to, at the same time, administer a dose of oil of chenopodium and castor oil? —J. H. H., California.

Reply: No. Any depressing agent—and oil of chenopodium cannot be considered as other than such an agent—diminishes the natural resistance of the animal. A hog with diminished resistance cannot be as successfully immunized against hog cholera as one that is normal. The vermifuge treatment should be administered at least a week prior to the time of giving serum and virus.—A. T. K.

A Discussion of Some Swine Diseases*

By S. H. McNUTT, Ames, Iowa

HEREIN are discussed a few swine diseases that are receiving somewhat less attention in the field and for this reason might be considered of less importance. The first of these diseases is swine variola or swine pox. This is of interest because it is often confused with other diseases, and because it may be so conspicuous as to mask a picture of the true disease causing the losses, and to result in an incorrect diagnosis. Also when one sees a disease it gives one confidence to know at least the name of the disease even though it may be causing but little trouble.

The second disease to be discussed is abortion in swine. This has been a serious disease since about 1917 but has received less attention than it merited because the individual stock owner has usually handled it himself. Abortion in swine assumes added interest when viewed from a public health standpoint. Then besides these two diseases a note will be added in regard to feeding spoiled corn to hogs.

Swine Pox

Without reviewing the literature on swine variola farther than Glasser's excellent summary, we find that pox of hogs was first described by Spinola in 1842. Glasser reports that swine pox is most common in young pigs and states that although it is prevalent in many countries it is not usually a serious infection except in the warmer countries including Morocco, Algeria, Rumania and Hungary. He states that the virus of swine pox is closely related to that of vaccina and small pox. He further says that either calf or pig lymph is used as a vaccine in warmer climates.

In our diagnosis work we found about 1% of the herds represented affected with a certain skin eruption, which we believed to be swine pox but we were unable to find any reference in literature to swine pox ever having been encountered in this country. We found that others had observed the condition and also felt that it was swine pox. The disease was observed at any season of the year in pigs up to 200 pounds in weight. Affected pigs showing evidence of generalized disturbance were found to be suffering at the same time from other diseases to which the symptoms were attributed. We have felt that the disease did not result in any generalized disturbance although in very young pigs it might have resulted in death.

Usually less than 80% of a herd are affected. Eruptive changes were mostly along the belly, inner sides of the legs and along the sides of the belly. No lesions were ever found on the nose, lips, tail or much below the knee or hock joints. The first changes noted were red elevated areas one-half to one centimeter in diameter. The center of these areas became slightly vesicular, later gray, then dark brown, shrunken and scab-like. About this central area the affected epidermis still retained its elevated position and with shrinking of the central portion there was an umbilicated or pox-like lesion produced. The central portion is not always depressed but may be elevated. A greater or less number of these circular circumscribed pox-like lesions may be present. From three or four up to 200 and even 300 of these areas have been observed. The lesions were usually not much more than two centimeters in diameter. From the time of exposure to the dropping off of the scabs covered a period of four to five weeks. There is little scar formation following recovery.

Sections for microscopic study showed the lesions to be similar to those caused by pox virus in other animals, except

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that true pustules were not present. The type of inflammation, the vesicle and the healing were typical of pox.

The disease was easily transmitted to other pigs but not to rabbits. In fact it was too easily transmitted. It got into our other experimental hogs where we had no desire for it and where we had no intention that it should be.

Evidence that the disease was swine pox is afforded by the gross general character of the lesions, the microscopic character of the lesions, and by the fact that it is a highly contagious disease of young pigs.

It is of importance that swine pox be differentiated from other skin diseases of hogs. It seems that this should be quite easy. Swine pox is the only disease where there is a pox-like lesion developed. There is usually no elevation of the temperature. It is highly contagious. In swine erysipelas there is a more diffuse erythema, a decided elevation of temperature, and the central lesion although circumscribed is irregular in shape. In erysipelas aged as well as young pigs may be affected and lastly the organism can be isolated from animals affected with erysipelas whereas cultures remain sterile from pox cases.

Abortion

The B. abortus (Bang) was found to be the cause of infectious abortion of swine, first by Traum in 1914 and was first described by Good and Smith of Kentucky in 1916. Other work was done by Hayes of California, Hadley and Beach of Wisconsin, Connaway and others at the Missouri station, and Doyle and others of Indiana. It is a common disease in Iowa. The manner of spread, symptoms, and other characters of infectious abortion in swine are so much like abortion in cattle that it is unnecessary to give any complete description but only to point out a few differences. Specific infectious abortion in swine has never been found to be due to other than infection with Bact. abortus, or one might be more correct in saying that infectious abortion of swine has always been found to be due to a member of the Brucella group of organisms. It is nearly always introduced with new stock although exceptionally it may spread from cattle to hogs (Connaway). The abortion rate is apt to be higher in hogs than cattle and the disease is more apt to apparently spontaneously disappear than is the case in cattle. If a group of sows abort and are immediately rebred, they usually abort a second time, but are not nearly so apt to abort a second time if allowed to go some little time before being rebred. The manner of spread is the same as in cattle. Experiments indicate that swine abortion is more apt to spread to cattle than is abortion in cattle to spread to swine, (Hadley & Beach).

An interesting point about the disease at this time is its relation to public health. The group of organisms to which the swine abortion organism belongs affects cattle, hogs, goats, man and rarely horses. The group of organisms is known as the genus Brucella. It produces undulant fever in man, a benign infection in goats, a serious infection known as abortion in swine and cattle. Evans, Carpenter, McAlpine, and Theo. Smith find that the organism affecting man is more closely related to the porcine strain of Brucella than to the bovine strains. Huddleson finds that all cases of an undulant fever in Michigan and some cases in California have been caused by the bovine strains whereas in other states the disease in man is almost always caused by the porcine strains. From this we have the theory that the infection comes mostly from hogs and that infectious abortion of hogs is a serious danger for certain people. The type of undulant fever we have in this country is usually mild and only a certain percentage of people are susceptible. It is interesting to note here that if the infection causing undulant fever in man in this country comes from cattle or hogs, then the evidence shows the infection to be mostly of the hog type and the dairy cow is only exceptionally dan-

gerous and then depending on the individual susceptibility of the person and the type of organism with which the cow is infected.

In regard to treatment and prevention of abortion in swine there is nothing new to offer. The disease may be cleaned out of a herd the same as in cattle.

Vulvo-Vaginitis of Gilts

There is also a notation to make in regard to the feeding of spoiled corn to pigs. In the fall of 1927 and again in 1928 reports were made by the Veterinary Investigation Department in regard to an inflammation of the vulva and vagina in gilts. The inflammation was found to be due to feeding spoiled corn. These findings have been substantiated by work done in Illinois. Evidence showed that spoiled corn contained a toxic principle which caused an inflammation of the genitalia. At that time it was thought that only certain batches of spoiled corn contained the toxin. For a good many years a swelling of the vulva had been noticed in very young pigs, often less than 30 pounds in weight. The condition never caused any trouble and was thought to be physiological. We now find that this benign temporary enlargement is also due to feeding spoiled corn. Evidently most spoiled corn contains some toxin but almost never in sufficient quantity to prove serious.

BOVINE GASTRIC STRONGYLOSIS

In October, 1928, a carload of Hereford heifers from the Texas Panhandle was shipped to Northeast Kansas and placed on a pasture that had been previously occupied by sheep. The calves did splendidly until the latter part of December when several of them were noted to be unthrifty and soon evidenced a severe diarrhea. Several of these calves died and, upon investigation, it was found that they were infested with stomach worms.

Will VETERINARY MEDICINE readers discuss treatment? Is stomach worm infestation common in calves and how long will lots and pastures remain infested?

SOME CONCLUSIONS REGARDING CAESARIAN SECTION IN SOWS*

Until recent years swine obstetrics was not a very prolific source of income for the veterinarian and even now in some cases is not a very prolific source of satisfaction. However, with all its ups and downs the relief of dystokia in sows has become a part of routine practice and deserves very careful study in order to make it successful both for the swine owner and the veterinarian.

As the technic of relief of dystokia through the natural channel must be acquired very largely by experience, I will confine my remarks to the practical side of caesarian section. Some may ask, has it a practical side? To this I have no hesitation in saying, Yes. I believe my earlier experience was similar to that of many others and I am of the opinion that many are still following the practice of performing that operation only as a last resort, after so much time has elapsed that the prognosis is necessarily unfavorable.

Until about 1920 my results had been such that there was a grave question in my mind as to whether to continue operating or to discontinue it entirely. My percentage of recoveries had been just large enough to keep me operating when I was positive that everything else possible had been done. That of course included extensive instrumentation, watchful waiting, etc.

Finally in 1920 I determined to ascertain to my own satisfaction whether or not one was justified in operating upon these cases early, before the patient was exhausted or lacerated by the hands or instruments. During the entire season I positively refused to operate on any patient unless everything was favorable for recovery. As a result I operated upon seven cases with 100 per cent recoveries. This result gave me the greatest encouragement and satisfaction, and I felt that I was justified in recommending

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the operation to my client whenever the usual means of relief did not bring immediate results. I also felt justified in refusing the operation if the owner had procrastinated too long or had lacerated and probably infected the patient by his bungling means of relief. While I have not drawn the line quite so close since then I have been very cautious in selecting my cases, but above all I have operated as soon as possible after it was evident that the natural route was not practical or possible within a reasonable length of time.

I wish to place particular stress on the time limit because it is impossible to ever be sure when parturition is over. It so often happens that some careless piggie loiters by the wayside until several hours after your departure and then gets his head fast. The average sow is not worth the price of several visits and as a rule the operation can be performed in as short a time or even less time that it takes to wait for the natural presentation of several pigs and to give what assistance may be necessary. Besides the time factor there is much satisfaction in knowing that a job has been completed and that all the pigs have been removed.

As to the technic of the operation I think that any of the approved methods will be reasonably successful if the condition of the patient is right and too much time is not wasted in performing the operation. In my early experience I nearly broke my back or legs or both, squatting or kneeling over my patient till I decided never to operate except with the patient on a table. However, I found it was often very hard to secure the necessary material to extemporize a table and to get the man power to place the patient on it. All this led to the present method of restraint. Two ordinary farrowing pens are sufficient space if it is necessary to economize on room and if the patient is quiet, and on the left side I often prepare the field of operation before I confine her in any way.

Either the front or the hind legs are secured to a post or partition and the legs at the other end are tied together, and by means of a small block and tackle the patient is stretched out reasonably tight. (This can of course be done without the block and tackle, but I always carry one, and it is convenient to use.) One man is stationed at the head and fore-quarters to keep the patient more quiet. Next I secure a clean box of suitable size to hold my instruments and pan or pans of mild antiseptic solution. I prefer to have my instruments out on clean paper towels rather than in a watery solution, if the place is not dusty. Last but not by any means least I get a box, stool or even my medicine chest to serve as a seat for myself. This I place immediately behind the sow against her buttocks and after everything is ready and within reach I seat myself with one leg extended along the back and the other over the sow's hind legs and along the belly. This puts me in a very comfortable position and I can work with much more satisfaction, and when I get through I do not feel that I had been the victim of severe corporal punishment.

I make a large incision through the skin at one stroke of the knife, and the first severe pain is over. If it is done quickly and with a sharp knife the pain is not very severe. Next I puncture the muscles sufficiently to insert one finger of each hand and as quickly as possible tear an opening large enough to readily admit the hand and allow the removal of the uterus and its contents without too much traction. Then if I can get all the pigs from one incision into the uterus I do so but if necessary I incise one cornu, empty it and suture the opening and repeat the process on the other horn. For suturing the uterus I use catgut in a double running stitch ending where I started and requiring but one knot. The opening in the muscles I close with one or at the most a double stitch with linen suture and one knot, leaving the end long enough to hang out of the lower commissure of the skin incision. The skin is

then closed in the usual way and the operation is a success whether the patient dies or not.

In the years from 1920 to 1928 inclusive I have had three seasons with 100 per cent recoveries. While I think I have reason to feel proud of my record, I hope I will not be considered boastful for reporting it. I only wish to substantiate my conclusion after many years' experience that cesarian section in sows is a practical operation for the general practitioner if he has a little skill and will operate before it is too late.

H. B. Treman.

Rockwell City, Iowa.

POKEWEED CAUSES HEAVY LOSSES IN SWINE HERD

Several cases of mature sows showing signs of severe intoxication, followed rapidly by posterior paralysis and death, were found. The temperature was usually normal, becoming subnormal just before death. Necropsy revealed an acute ulcerative gastro-enteritis. The liver was extremely swollen and dark, and on incision exuded freely a wine-colored fluid from the cut surface. No other lesions of importance were found. The intestinal contents invariably contained a high percentage of plant material. These sows were the property of Tuskegee Institute and belonged to a group that were running in lowland pasture with much underbrush and a stream.

Plant poisoning was suspected, and Dr. G. W. Carver of the Research and Experiment Station was consulted; and a trip made through this pasture revealed large quantities of pokeweed, *Phytolacca decandra*. A comparison of microscopic sections of the pokeweed with some of the material from the gastric contents showed them to be identical.

Circular 71 of the Alabama Polytechnic Institute Extension Service lists this plant as a poisonous plant of Alabama, stating that large doses of the berries and roots are a gastro-intestinal irritant.

A pig fed a few small pieces (¼ to ½ inch cubes) of the pokeweed root in the swill in the afternoon showed definite signs of poisoning on the following morning. This was manifested by unsteadiness when standing. The pig was observed just before lying down; and after having lain down was unable to rise later. In the afternoon retching was noticed along with jerking movements of the legs similar to that seen in strychnin poisoning. The temperature was subnormal; the animal appeared in a moribund condition. It was killed at 4 P. M. and necropsy revealed the following lesions:

A severe hemorrhagic gastritis, the hemorrhagic areas standing out in contrast to other portions of the stomach which were nearly normal, indicating that the hemorrhagic areas represented points of direct contact of the irritant with the gastric mucosa. Inflammatory areas were found in the duodenum and the last six inches of the ileum, the latter being severe.

This case of experimental poisoning, combined with the fact that losses from this condition ceased when the hogs were changed to a pasture where there was no pokeweed, tend to indicate that it was quite probably the cause of the trouble. Other swine herds in this locality are suspected of having been poisoned with this plant also.

A further study of this condition will be made to determine if there is a seasonal variation in potency; the most effective means of eradicating the plant, and the losses it causes in this vicinity.

Fred D. Patterson.

Tuskegee Institute, Ala.

ANAPLASMOSIS

Anaplasmosis, supposed to be a warm weather disease, is occasionally observed in the winter time. Some cases were observed in January during quite cold weather in Oklahoma. This disease is of considerable economic importance. Unfortunately the method of transmission of the *Anaplasma marginale* has not been determined and there is no way of identifying anaplasma carriers except by blood examination. Hence the danger of introducing infection into anaplasma free areas

Common Diseases of Swine*

Hog Cholera

CHOLERA continues to be the most important disease of swine, but a number of other diseases have increased in importance so much during recent years that the question of diagnosis has become a very important one. It is not good practice to vaccinate the hogs of a herd in which disease appears without determining first whether the virus disease is present. If the ailment is some disease other than cholera not only will valuable time be lost by vaccinating, but the loss from certain other diseases may be greatly increased by such a procedure.

The onset of cholera is characterized by inappetence. The animals hide in their beds. They run a temperature of 105° F. to 108° F., have a wabbly gait and a tendency to knuckling. It is a herd disease and a considerable percentage is usually affected within the first twenty-four hours.

In pure virus disease, there may be no lesions but in hog cholera as we see it, perhaps due to complications, there are certain lesions that aid in the diagnosis. There are scarlet red areas in the skin on the under side of the animal. From one to several groups of lymph glands are involved, showing hyperemia or hemorrhage particularly in the peripheral portions of the gland. It is a sort of subcapsular congestion or hemorrhage. There is petechia in the lymph glands and perhaps in the kidneys or elsewhere, but petechia must not be considered as pathognomonic of hog cholera. Pigs under ten days of age commonly exhibit petechia of the kidneys and other tissues and hogs dead of various diseases exhibit petechial lesions. A darkened bone marrow is a common lesion in hog cholera.

* Notes from an address by Dr. A. T. Kinsley, Kansas City, at the 31st annual meeting of the Nebraska Veterinary Medical Association, Omaha, December 11-13, 1928.

Hemorrhagic Septicemia

Many doubt the existence of hemorrhagic septicemia, but I believe it is occasionally seen as an acute disease in hogs and still more commonly in a chronic form. Its onset in a herd is insidious. Seldom more than 5% are affected in the first 24 to 48 hours. The synovial membranes are involved and lameness but not knuckling or wabbling is a characteristic symptom. The lesions are much the same as those of hog cholera. There is a more extensive petechia of the lymph glands and the skin involvement is more extensive also than in cholera. Pleurisy, epicarditis and pericarditis is common. Peritonitis is seen less frequently.

Flu

Flu in swine is preeminently a herd disease. Often 80 and frequently 90% of the animals in a herd are affected within the first 24 hours. The cough is a characteristic, almost a pathognomonic symptom. There is a rapid shrinkage, more rapid than in any other disease of swine. The lesions are those of an uncomplicated bronchitis. The mortality is low ordinarily, but may be high in animals improperly cared for—exposed to inclement weather. Death when it results is due to pneumonic complications.

Infectious Pulmonary Edema

Pulmonary edema is a disease of swine about which very little can be found in veterinary literature. It is a common condition in Missouri, and I presume exists in Nebraska also. It is a distinct disease, definitely infectious. There is possibly some relation between it and flu; at least a pleomorphic gram-positive organism found in 90% of the cases of pulmonary edema can be demonstrated in 60% of the cases of flu. Possibly they are different stages of the same investigators do not feel that it is advisable to trust to nature to supply sufficient iodin for the animal's needs.

From a large number of analyses made of common feeding stuffs, it is evident

that one should not depend upon ordinary feeding materials to supply iodin in sufficient amounts.

The Hairless Pig Disease

Hairless pig disease has been a common cause of extensive losses in young pigs in many sections of the northern half of the United State and Canada. This can be accounted for in no other way than through a deficiency of iodin in the sow's feed during pregnancy. This deficiency of iodin prevents the proper development of the young, with the result that they are often born dead and without hair or are extremely weak and listless and die soon after birth.

The thyroid glands in pigs suffering from this disease are several times as large as the glands that are found in normal pigs, but even with the great enlargement they do not contain larger amounts of iodin. The larger the thyroid gland, the less iodin it contains. This enlargement is an effort on the part of nature to provide more gland material for the deposit of iodin in the gland.

This condition is very prevalent in Montana, and other northwestern states, and is frequently found in middle western states, such as Wisconsin, Minnesota, Iowa, and Illinois. That this condition may be more prevalent than the ordinary person would believe is quite likely, due to the fact that in most sections of the United States and Canada, there are certain seasons when a great number of live stock are born weak and unthrifty and soon die.

Sows Receiving Iodin Do Not Have Hairless Pigs

It has been found that through the use of some form of iodin in the mother's feed that this condition can be prevented. Where the young are frequently born with big neck or goitre or are weak and unthrifty and die soon after birth, it is necessary to supply iodin in order to produce strong vigorous young. In many sections of the northwest, also in many sections of the corn belt, it is now a common practice to supply iodin in some form to breeding females, especially during the summer months.

ailment. The characteristic symptom is thumping but the thumps in infectious edema differs from the thumping caused by ascarid infestation. There is no elevation of temperature and but a small part of the herd is affected at one time, but in the course of six weks nearly all of the herd will be affected. The only lesion in uncomplicated cases is a collection of fluid in the lungs.

Erysipelas

Erysipelas is becoming more and more common in hogs. It appears in three forms, acute, subacute and chronic. The acute type is rare. It is characterized by a sudden onset. The subacute type of the disease usually appears in only one or two animals in a herd and no additional cases may be seen for ten days or longer. Vomiting is a common symptom. There is inflammation of the conjunctiva and the eyes are gummed as in hog cholera, but in erysipelas there is also edema of the eyes and often of the ears.

The chronic form is known as diamond skin disease. In addition to the skin, this ailment often affects the synovial membranes of the joints, producing lameness and a serous or purulent inflammation, often with erosion. A vegetative growth on the heart valves also occurs. The ears and tail and portions of the skin in other parts of the body sometimes slough.

Enteritis

Enteritis of swine exists in two or three types. Most important is necrotic enteritis due to the suipestifer infection. Necrotic enteritis is characterized by coagula on the mucous surface of the intestines, a dyphtheritic inflammation.

Swine dysentery is another type of enteritis more acute than the necrotic form. It is characterized by a bloody diarrhea and death in two or three days. It is frequently a complication of the necrotic type. This combination of necrotic enteritis and swine dysentery is a difficult condition to diagnose.

Necrotic enteritis sometimes takes on a septicemic form which needs to be carefully differentiated from hog cholera, acute hemorrhagic septicemia and acute erysipelas.

Esophagostomaisis is a common parasitism of swine. When the esophogostoma are present in great numbers they produce an inflammation of the intestinal mucous membrane which is apt to be confused with necrotic enteritis or swine dysentery. It is recognized that parasites take a heavy toll from swine, but this is not all the loss that they occasion. They prepare the way for many of the infectious diseases, and but for parasites the loss of swine from infectious diseases would be much less.

Dietary Ailments

Diet likewise or rather improper diet, must be given consideration as a predisposing factor in a number of diseases. Unsanitary surroundings too, of course, contribute their share as factors in infectious diseases. The McLean County system of swine production is worthy of greater extension. The swine industry may be said to depend upon its adoption, at least in some measure.

There have been many reports this year of another ailment in swine. I do not know that there is any unanimity of opinion as to just what occasions it. Of course, we have for sometime recognized a condition in swine occuring on rape and clover pastures termed trifoliosis, but during the past season there have been many reports where the skin of the snout sloughs off or peels off and in some cases the skin along the belly also peels off. This has occurred in every breed of hogs and in hogs on every type of pasture and feed. It appears to be a dietary ailment, a protein poisoning perhaps analogous to anaphylaxis hay fever, urticaria, etc.

It sometimes affects only a few animals in a herd, but more frequently a considerable percentage of the herd is affected. The snout first turns red, then purplish, then blue and later the skin comes off, often in a single piece. The mortality is low, probably less than 2%, but the loss of condition, presumably from interfering with eating, is considerable.

Polyarthritis

Polyarthritis is also increasing in swine. This is a term applied to an inflammation of the joints of swine caused by *B. pyocyaneous* and some other organisms. It is probably due to prenatal infection. If infection of the uterus is eliminated from swine, or rather, if sows with infected uteri are eliminated from the breeding herd, polyarthritis is at the same time eliminated.

Post-Vaccination Ailments

We will have less trouble in diagnosing post-vaccination ailments if we keep in mind the symptoms and lesions of the common ailments of swine, and if we inquire carefully into the history of the herd. In addition, in autopsying animals that have died following vaccination, we must keep in mind that a healthy hog will exhibit the lesions of cholera for three weeks after vaccination and that a sick hog will exhibit these lesions for six weeks or even longer. Further, the blood of such animals will convey hog cholera to susceptible animals, but that does not make the disease from which the animal is suffering hog cholera, nor is revaccination of any value if the animals be suffering from necrotic enteritis, swine dysentery, hemorrhagic septicemia, erysipelas or any one of several conditions that may be present.

The secret in successfully handling post-vaccination troubles is to avoid them, and this can be done by vaccinating only healthy hogs. On some farms, we can scarcely find healthy hogs, in any season, and such farms have post-vaccination losses year after year, regardless of who does the vaccinating or what serum and virus is used. Unless cholera infection in such a herd is imminent, it certainly should be treated before the animals are vaccinated. If hog cholera is already present in such a herd, or is present so near by that the danger is imminent, the animals should be given serum alone, and then treated for the enteritis or other condition that may be present. When this is cleaned up, they should be revaccinated with serum and virus in the usual way.

Poultry Practice as a Part of the Work of a General Practitioner*

By W. WISNICKY, Fond du Lac, Wisconsin

VETERINARY practitioners have shown marked flexibility in adapting themselves to the new kinds of service demanded by the livestock interests. Automotive power has replaced the horse to the extent that the equine species is no longer considered as the most important component of veterinary practice. Other species of farm animals have provided opportunities for veterinary service far in excess of that relinquished with the decrease in horse practice. No species of animal or fowl was left out of the domain of the veterinarians' activities.

Naturally the larger domestic animals with higher unit value have received primary attention and as a result many practitioners are confining their services entirely to the more valuable animals. The large centers of population afford opportunities for some veterinarians to devote all their time to the treatment and care of pet stock. The fur-bearing industry has also given its problems to veterinarians interested in such practice. The poultry industry, however, has been rather slow in employing the practicing veterinarian to help in solving the numerous poultry disease problems. Perhaps we can reverse the last statement and say that the veterinary practitioner has been rather slow in availing himself of the opportunities that exist in the field of poultry practice. In all probability such is the case.

It cannot be denied that there is a considerable portion of the practicing veterinarians in this country who give little thought and make no effort to give service along poultry disease lines even though the opportunity exists for them to do so. Some grounds of justification for this attitude can be claimed by the older group of practitioners who did not have the opportunity to receive intensive instruction in poultry diseases and poultry husbandry during their academic period. The younger veterinarians, however, are benefactors of such training as most of the veterinary curricula contain thorough courses not only in poultry diseases, but also in all phases of poultry practice and management. The younger veterinarians are as fully trained in poultry diseases as they are in diseases of other animals.

Discouraging Factors

There are some factors that may be mentioned at this time which appear to discourage the practitioner from giving more attention to poultry diseases. The most important of these factors are: the vast amount of poultry literature circulated among poultrymen free of charge; the giving of poultry disease service by those not adequately trained in that line, as for example county agents, feed salemen and proprietary poultry remedy salesmen; and the low economic value of the individual bird and in many instances of the flock.

Poultry disease literature is liberally distributed by the Federal Government, the various state agricultural colleges, producers of poultry feeds and venders of poultry disease remedies. Certainly in this age of enlightenment it would be contrary to the popular thought to contend that the poultrymen should not be enlightened regarding poultry disease problems. It is entirely proper that whatever is known about diseases whether concerning poultry or other forms of living creatures should be made available to the general public. It has been frequently observed that those who are informed regarding poultry diseases will in most instances seek the service of authentic poultry disease authority. Those who know nothing of poultry ailments easily fall victims to the pretending extortionists who con-

* Read at the 32nd annual meeting of the Minnesota Veterinary Medical Association, Minneapolis, Jan. 24 and 25, 1929.

tinually prey on the ignorant. So what at first appears a drawback to the veterinary poultry practitioner is in fact one of his greatest aids. The more people know about poultry diseases the more they will seek the aid of those properly qualified to give it to them.

Free contact service that reaches the poultrymen through public and private channels is perhaps the worst competition the practitioners have to meet and it is hard to beat a free proposition. In some cases poultry diseases are attempted to be taken care of with the help of the publicly paid veterinarians. The practicing veterinarian is not given any consideration. In other instances county agents or farm advisers spend considerable effort in attempting to care for poultry diseases. Then also there is the gratis service offered by feed dealers and remedy salesmen which in the final conclusion the poultrymen pay dearly for.

Free service through state or public agencies for the time being is an asset to the poultryman. It almost amounts to a subsidy. It cannot be the best service obtainable, however, because a veterinarian in a distant laboratory must take the poultryman's version of the history of the trouble; the history may be incomplete or incorrect and as a result an important factor in diagnosis cannot be utilized. Then again several diseased conditions may occur, and one or two specimens sent to the laboratory may not represent the cause producing the serious loss. If the local practitioner were taken into the scheme he could get all information first hand, size up the situation properly and make correct observations from a disease viewpoint, and then if necessary seek the aid of a state or private laboratory in order to establish an accurate diagnosis. Such service would be complete and valuable. Most of the cases can be diagnosed by the local veterinarian without sending away specimens for further examination. This procedure would not only give the poultrymen the very best service obtainable, but would also relieve the veterinarians employed by the state from a large amount of routine work and allow them more time to be devoted to investigational work along poultry disease lines.

The low economic value of the individual is an unavoidable condition and therefore our plan of handling poultry diseases must necessarily follow a different scheme than that used in treating large animals. Preventive medicine and flock treatment are the lines along which the practitioner must work in handling his poultry practice.

Opportunities for Poultry Practice

The poultry industry has developed and increased in value so that now it is classed as a billion-dollar industry. It is exceeded in value among the livestock industries only by the dairy industry and the swine industry.

The growth of the industry brought about conditions of greater intensification. As a result the incidence of disease is greater. Not only does disease appear more easily under such conditions, but it spreads faster and the losses are greater. At this time the ravages of disease cause more serious losses in poultry than in any other species of domestic animals.

Here we have pictured before us a valuable animal industry struggling to reduce the large mortality in its flocks. The practicing veterinarians, the most logical group to effectively serve the poultry interests in relation to disease, should make the best efforts to acquire and hold this potential assert for their profession.

To undertake a poultry practice the veterinarian must possess certain qualifications. First of all there must be a genuine and eager desire to perform such work. This is easily acquired if there is an inherent liking for poultry. Secondly, and perhaps of most importance is a thorough acquaintance with poultry diseases, method of handling them, preventive measures, and a full appreciation of sanitary and hygienic measures. In poultry diseases, veterinary practice will find its greatest value in preventive methods. This is the foundation around which the practice must be built.

The training in macro and micro-anatomy, physiology, pathology, pathogenic bac-

teriology, and other basic sciences which every veterinarian has had an opportunity to master enables him to easily adapt himself to poultry practice. In addition to the wealth of disease literature intended for utilization by poultrymen, there is a vast amount of scientific material published in literature circulated among the profession. In recent years, poultry diseases perhaps have occupied the primary position in point of the number of articles published on animal diseases. This abundance of published knowledge makes it easily possible for those interested to acquaint themselves with the very latest developments in this field. Since in poultry practice an autopsy of one or more fowl is nearly always included in an effort to establish a diagnosis, the veterinarian has this excellent additional advantage to develop and verify his knowledge of diseased conditions.

Essentials to Success in Poultry Practice

Success in poultry practice cannot be fully achieved by possessing knowledge of the diseases alone. A full acquaintance of all the other phases of poultry husbandry are also essential. The principles of inheritance, the various phases of management, and an ability to judge fowl all enter into the solution of poultry disease problems.

Inheritance seems to be more important in poultry than in other classes of larger animals. The prolific ability of the hen coupled with the fact that there is a generation turnover almost every year presents a situation which makes it easily possible to lose desired inherited characters. Many flocks today are lacking two essential inherited characteristics, namely: vigor and vitality. The mania for rapid growth, early maturity, and a high egg production has obscured the value of such fundamentally important characters as vigor and vitality. To the medical mind these characters are easily evaluated in relation to disease; without them a disease control program must fail.

Proper environment requires excellence in all phases of management. In investigating a disease outbreak it is advisable to observe the type of building, method of ventilation, and amount of moisture in the building. Inquire closely into the system of management and into feeding practices. Examine some of the feed. Connect up these observations with the appearances of the flock as a whole. In many instances the cause of the trouble may be easily apparent in the environment and the remedy suggests itself.

Judging poultry not only from the health standpoint, but also for utility and exhibition is a necessary requirement in poultry practice. The poultryman expects the veterinarian to know these things and at once indulges confidence in him for possessing such knowledge. Farmers often ask a veterinarian to cull their flock or to select a few of the best cockerels. To do this utility as well as exhibition factors must be reckoned with.

Methods of Handling Poultry Practice

The question may arise as to the method of handling a poultry practice. Naturally, first of all, as had been already suggested a veterinarian must qualify himself with the ability to handle such work. The next step is to let it be known that you are qualified and equipped to give service along poultry disease lines. Ethical advertising may be resorted to. In making calls to treat larger animals make it a practice to inquire into the welfare of the flock. Ask to look at the flock. If any merit is apparent compliment on such and offer some constructive suggestion if such is in order. As some practitioners do not desire to do poultry practice it would be well to solicit their cooperation and have them refer poultry problems to you. There should be at least one veterinarian in each community interested in poultry diseases. It does not take long for the work to advertise itself.

If service is required, wherever possible attempt to make a call and see the flock. Do not get the people in the habit of just bringing the birds to the office for examination. You can be of greater service by visiting the premises. After examining the housing, feeding, and sanitary conditions look to the general condition of the entire flock. Then

center the attention to the birds actually showing morbid conditions. Take temperatures on a few of these birds. Autopsy several sick specimens. If a satisfactory diagnosis cannot be made from indications thus far, then take two or more specimens to the office of private laboratory for further examination.

A Small Laboratory Advantageous

It is entirely feasible and desirable to have a practical working private laboratory with essential equipment for doing poultry diagnostic work. A good deal of this equipment would be convenient for diagnostic work with other animals. The purpose of this private laboratory would be to enable one to diagnose diseases such as bacillary white diarrhea, fowl typhoid, fowl cholera, coccidiosis, etc. The list of equipment and material needed is as follows:

Microscope.

Incubator (small electric poultry incubator will suffice).

Bunsen burner or alcohol lamp.

Platinum wire loop and needle for bacteriological work.

Block of stains.

Rapid agglutination testing set.

Culture media (may be purchased tubed from laboratory).

Rapid pullorum antigen.

Avian blood sera (positive and negative for B. W. D. anti-bodies).

Spatula.

Grease pencil.

Twelve per cent sodium chloride solution.

The Laboratory an Aid in Diagnosis

As an illustration of the procedure that could be followed in diagnosis of bacillary white diarrhea in the chick the following is suggested: Procure the complete history of the chick specimens submitted including brooding conditions, feeding, mortality rate, exact age, etc. If the chicks are not dead kill them by dislocating the head from the neck. Cut the skin at the sternum and peel it back both ways. Heat the spatula red hot and sterilize a region on one side of the keel bone directly over the liver. With a sterile needle take a culture from the liver and plant it on an agar slant. Another culture may be taken from the yolk sac in similar manner. Identify the tubes with grease pencil. Complete the autopsy, noting the condition of the various organs. Place the culture in an incubator and incubate for 24 hours at 37 deg. C. Examine the growth noting the type of colony. Make a smear from the growth, stain, and examine under the microscope, noting the morphology of the organisms present. Place a small quantity of the 12 per cent saline solution into tube containing culture and wash off the culture, endeavoring to obtain a turbidity similar to that of the rapid antigen. This is used as an antigen. Place 0.5cc of the prepared antigen on a warm glass plate of the testing outfit. To it add 0.02cc of serum containing S. *pullorum* antibodies and mix the two with a toothpick or glass rod. Make reading in about a minute. The history, autopsy findings, bacteriological and serological examination give sufficient information to formulate a diagnosis. The expense of conducting such tests is not great and the period of time taken up by the work is not excessive if the procedure is systemized.

This method enables the practitioner to give prompt service. Where bacteriological and serological work is necessary a diagnosis is possible within 24 hours. If the specimens were sent to a laboratory it would take an average of three or more days to receive a reply and the advantage of the personal contact with the poultryman could not be had.

Procedure for the diagnosis of other poultry diseases can be easily worked out with the equipment mentioned above.

Important Considerations in Treatment of Poultry

After the diagnosis has been made, attention is directed toward treatment or advice along sanitary and preventive measures. If any drugs or biologics are required, they should be dispensed by the practitioner and in some cases the actual treating done by him.

Too much emphasis cannot be placed on the value of sanitation and hygiene. Instructions regarding cleaning, disinfecting, and use of non-infective range must be fully stressed. Intestinal parasites including coccidia can be controlled in a large measure by sanitary practices and the use of a clean range program.

This paper would be considered incomplete if some mention were not made of the remuneration the veterinarian is to receive for his efforts along poultry disease lines. It is obvious that the work has to be paid for on a professional basis either directly or indirectly. The charge should be commensurate with the amount of service rendered. Usually there is no complaint on the service fee. If the service is paid for on a professional basis, the poultryman will have greater respect for it and will actually follow out the veterinarian's recommendations in regard to preventive and sanitary measures. If the service has no value it would be better that it were not given, and if it is valuable they are willing to pay for it; if not they should be. There is no doubt but that the poultry industry as a whole will welcome the efforts of the practicing veterinarian and will be gladly willing to compensate him in a full measure for his services.

STUDIES OF POULTRY PARASITES

A poultryman in Washington, D. C., lost 75 per cent of several hundred chicks from gapes. Investigation showed that this loss resulted from the use of one of the poultryman's fields, for about 24 hours, as a resting place for a flock of turkeys being driven overland. The chickens became infested by gapeworms left by the turkey flock. In addition to producing the noticeable symptoms of gaping, by obstructing the windpipe, gapeworms also weaken their victims by sucking blood.

Tapeworms have been named as the cause of death of 50 per cent of the chickens in some Maryland flocks. There have been correspondingly heavy losses of domestic geese in Oregon from a closely related parasite. In addition to causing death, tapeworms bring about emaciation, reduced egg production, and more or less complete paralysis.

Slender, threadlike worms in the crops of turkeys were found to have caused the death of three-fourths of the birds in a flock of 200, and the survivors were scarcely worth marketing. The gizzard worm, one of a general class of roundworms, is also serious because it attacks the walls of the gizzard and interferes with the food grinding function.

The ever-present birds of the countryside flying from one farm to another, or, on the other hand, flocks of migrating birds, may leave behind them parasites which will later prove to be of economic importance.

The spread of poultry parasites involves in some cases an intermediate host. For the development of poultry tapeworms the hosts are earthworms, snails, slugs, and insects; for the fluke, which invades the oviducts of chickens, it is the dragonfly; for the eye worm it is a cockroach; for certain other parasites the host is yet to be discovered.

Control measures to check inroads of parasites on poultry flocks, consist largely in sanitary equipment and management of flocks in such a way that the life cycle of parasites is broken so that infection can not get back to the fowls. Prompt disposal of droppings from poultry houses, plowing up or scraping off the top soil of chicken yards, the use of a rotation system of yards, the judicious use of disinfectants, and providing sanitary feed and water containers, are among some of the practical means of prevention.

Even though poultry raising has been highly successful, it is unwise to relax precautions against parasitic foes of poultry. By increased attention and knowledge, the ravages of parasite enemies may be checked and poultry given a better chance.—Eloise B. Cram, U. S. Department of Agriculture.

Parasites of Poultry*

By L. D. POTTER, Storm Lake, Iowa

THE first and probably the most important of the so-called external parasites the veterinarian has to contend with is the human parasite, who sends inexperienced men out over the state to diagnose and treat poultry. A hatchery apparently receives literature from all the would-be long distance diagnosticians. In our hatchery we have literature from Veterinarians who dispense, and advertise, explaining how much poultry medicine can be sold, and what an enormous profit can be made therefrom by the hatcheryman. Also literature from a neighboring hatcheryman, giving the price of material for the hatcheryman to make the "Intradermal blood test for B. W. D.," whatever the intradermal blood test may be. I think in a true sense it would be called an impossibility. However, the laws of Iowa seem to be about as ineffective in exterminating this human parasite, as they are to exterminate the louse, mite and intestinal parasites.

But to discuss the round worms and tapeworms of the fowl. Intestinal parasites in small numbers infest the majority of fowls without doing perceptible harm, but there is always the possibility that conditions for their propagation may become so favorable as to turn the mildest infestation into a harmful parasitism, and this no doubt, occurs many times to such an extent that an entire flock is practically destroyed by it.

Many times a flock owner will bring in a fowl for post-mortem examination and if it proves to be round or tape-worms or both, they will inquire if they should treat only those that are visibly affected. It is my opinion that every fowl should be treated the same as would be done in a herd of pigs if cholera is diagnosed in the herd.

The lowered vitality caused by internal parasites, I believe, is in a large percentage of cases responsible for other diseases such as roup, cholera, typhoid, etc. It has been my experience especially with roup that tape-worms are invariably present in large numbers and the diagnosis of any disease in chickens should always be preceded by autopsy.

Round Worms

The round worms are probably the most common of the internal parasites. The small cecal worm may be found in probably 75 per cent to 80 per cent of fowls, these worms are known to transmit the blackhead protozoa. In the small intestine we find the large round worm which causes a disturbance of digestion and nutrition, loss of weight and stunted growth in chickens that are well fed. Also, the loss of egg production in the laying hen which is of great importance to a flock owner.

The introduction of one infested bird may mean the infestation of the entire flock as the worm eggs are picked up in the feed, water and droppings of the fowls. The development from newly hatched larvae into mature worm takes place in three to four weeks.

The symptoms caused by a heavy infestation of round worms are: loss of appetite, unthrifty condition, great emaciation, paleness of wattle, comb and mucous membrane which are brought about by robbing the host of food nutrients and by poisonous substances given off by these intestinal worms, oftentimes to the extent of irritation, inflammation and diarrhea.

I believe we veterinarians oftentimes overlook the opportunity to render our clients a service, which, no doubt, would prove profitable in the long run, by failing to observe and call attention to such conditions existing in poultry on the farm and at the same time doing the manager a favor whom in most cases is the wife who, might in turn, bring you the opportunity to care for the other livestock on the farm.

Sanitation is a very good thing, but it is one thing to talk it and another thing to

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practice it. When obtained it is worth all the time spent in advocating it.

The small round worm of the blind gut or ceca and the gizzard worm, *Spiroptera hamulosa,* I believe is not so important in this section. They should always be kept in mind, however, especially, when performing an autopsy.

The gape-worm or forked-worm is of most importance in young chicks. Their presence is indicated by wheezing, gasping and expulsion of frothy saliva from the mouth, dull appearance, loss of appetite, rapid emaciation, opening the mouth and extending the head high in the air, coughing and shaking the head. Sanitation, again, is very important in the control.

Tape-Worms

There are some thirty species of tape worms described as infesting the fowl. The tape-worms all live in the intestinal tract and absorb through their body nutrients taken in by the fowl and digested.

The *Taenia infindibulaformis* is the commonest tape-worm of chickens. The most common mode of infestation is through the fly and as young birds are more active in catching flies than older birds they are most often affected. The symptoms manifested by chickens infested with tape-worms to any extent is an unthrifty condition, unkempt appearance of feathers and emaciation.

Tape-worms in large numbers produce a marked irritation with loss of appetite. A very marked catarrhal condition is usually found in the posterior part of the bowel, and often, death of the infested bird. Fowls with slight infestation may not manifest any symptoms. The degree of trouble is largely governed by the amount of infestation.

Birds with only slight infestation devour large quantities of feed and show increased appetite. The irritation and often diarrhea cause an indigestion to such extent, the feed is passed through the intestinal tract only partilly digested, therefor, proper absorption of nutrients cannot take place. Restlessness is often noticed and in young birds, as the owner says they seem to stand still or do not develope.

It is not uncommon to hear a flock owner say after treating his birds for worms that they have straightened out and are doing fine and they believe are making better gains on less than half the feed.

For our hatchery every flock must show a strong vitality before the eggs are selected for hatching, and in case any flock shows symptoms of intestinal parasites, they are treated at least one month before delivering eggs. I believe to get the proper conception of the importance of intestinal parasites and the difference between badly infested flock and flocks free from intestinal parasites, it would pay every veterinarian to treat some flocks and keep a close check on them as is necessary with hatchery flocks, let the owner know you are interested in the welfare of the flock. The lady of the house will be much quicker to show appreciation of help for her chickens than a man will for his pigs or other livestock and the remuneration will be worth while, especially if you can find a way to exterminate some of the larger external parasites mentioned at the beginning of this paper.

JIMSON WEED AND HEMP POISONOUS

"I am sending you under separate cover two samples of weed gathered from a farm under our consideration located near Clare and in Webster County (Iowa). Will you kindly name them for me?"

The plants sent for identification are Jimson weed, *Datura stramonium,* and common hemp, *Cannabis sativa.* Both are toxic plants. The former is very common in barnyards. It has frequently been stated that the plant prevents hog cholera. This plant contains two toxic alkaloids, daturin and hyoscyamin. Cases of poisoning from eating the seed have been reported in Iowa. Hemp, too, contains an active toxic principle known as cannabinol. It is a powerful narcotic causing exhilaration, intoxication, hallucinations, and its subsequent action is drowsiness and stupor, with little effect upon the circulation. These plants are becoming too common in the northern Mississippi Valley.

Ames, Iowa. L. H. Pammel.

Opportunities for Poultry Practice*

By PERRY P. STARR, Gainesville, Texas

BEFORE endeavoring to discuss the field of Poultry Practice and its relations to the practitioner, it might be well to inquire into the size and stability of the poultry industry.

A recent census shows that in the United States there are 360,000,000 chickens, 37,000,000 turkeys, 3,000,000 geese and 818,000 ducks—the value of which is estimated at $1,047,000,000.00. This census does not take into account the fowls in towns and villages. The value of a recent poultry crop is said to exceed the value of all the gold, silver, coal and iron mined in a year or a sum equal to the value of the wheat crop.

That the increase in the poultry population is exceeding the increase in the human population is evidenced by the fact that in 1880 there were but two fowl per capita, while at the present time there are more than 6 fowls per capita.

Texas is one of the ten states leading in poultry raising, and this data would seem to indicate that the poultry industry is of sufficient size to warrant the veterinarian's attention. His work is no longer confined to caring for sick animals, but it has extended to take in a broad field which comprehends the industry and the health of our country. This great increase in the poultry industry and the concentration of large numbers of birds on comparatively small land areas, has naturally brought with it many and new extensive problems in the matter of disease-prevention, disease control and disease treatment.

The poultry industry ranks lowest in the percentage of pure bred sires used, while the swine industry ranks highest. The fowl's efficiency to produce food (based on 100 pounds of digestible matter) is greater than that of the steer, lamb or sheep, but not as great as the hog or dairy cow. The fact that poultry can be used to utilize the waste of both manufacture and consumption will continue to increase their popularity. That it is a non-competing crop and furnishes a product for home consumption, will further insure stability and widespread production. The egg is the foundation of the poultry industry. To help produce more and better eggs is as important as to help control disease.

Ten years ago my poultry practice was limited to only a few clients, now my poultry practice extends over a broad territory. Those who have prepared themselves to render a service to poultry owners will readily testify that it offers a field of unlimited possibilities from a financial standpoint as well as from a satisfaction of work performed for economic good. In the smaller cities and towns—more especially in agricultural sections—a poultry practice offers more remuneration to the veterinarian than small animal practice because of the commercial value and the vastness in numbers. Veterinarians have said that remuneration from this branch of science was not sufficient to justify them to take the time to qualify themselves in this work; however, it has been the experience of the writer that the pathology of poultry differs very little from that of other species.

The control of infectious diseases will constitute the major portion of poultry practice, yet the veterinarian may serve the poultryman when occasion arises in at least two other capacities, viz, caponizing and culling. In advising the poultryman regarding the control of disease, it must be pointed out, first of all, that it is more economical to prevent disease and maintain health than to cure sick fowls. The individual fowl is of comparatively small value and attention must be focused on the flock. Some county or commercial demonstrators, extension departments, medicine companies, newspapers and radio stations seem to feel obliged to give as much information as possible, gen-

* Presented at an annual meeting of the Texas Veterinary Medical Association, Ft. Worth, Jan. 21, 1929.

erally completely ignoring the veterinary practitioner. The poultrymen, after taking all sorts of advice from such source, are then willing to pay well for reliable and scientific information and it is, therefore, up to the veterinarian to render this valuable service.

Some veterinarians do not appreciate the important field of poultry practice, and this industry, as composed of small units, probably suffers more from mis-management and neglect than any other branch of live stock industry in America. The future of the poultry industry is largely dependent upon the success attained in controlling diseases. In solving the disease problems, veterinary practitioners are approaching a responsibility that is testing the skill of the veterinary profession and compelling individual practitioners to increase their store of knowledge.

Poultry diseases encountered by the veterinarian are numerous and—like diseases of sheep—are more or less seasonable. In the fall and winter season we find chicken-pox, infectious bronchitis, roup (nasal and diphtheritic), sorehead, influenza or hemorrhagic septicemia.

In the spring, white diarrhea, coccidiosis, gape-worm, rickets and nutritional diseases are the chief offenders in young chickens. Other ailments to be observed are entero-hepatitis of turkeys, tuberculosis, pneumonomycosis, purulent peritonitis, sarcomatosis and emaciation.

External and internal parasites are found the year round unless combatted by diligent co-operation of flock owners. External parasites, which are a great menace in some sections of the country, can be removed by a dipping process. The most important parasites that affect fowls are the round worms, the tape worms, the lice and mites.

Nutritional diseases or deficiency diseases of poultry do not differ much from those of other animals and of man; but occur more frequently in poultry than in any other class of live stock. This condition is due to the lack of fat soluble, vitamin A, and is supplied in green feed, butter, egg yolks and milk. The lack of this vitamin lowers resistance and predisposes fowls to other affections of the eye—the most common of which is roup. The leg weakness of chicks is thought to be due to lack of vitamin D and lack of exposure to sunlight. If fowls are supplied with cod-liver oil and sunshine they make a rapid recovery.

Gout may develop in chickens fed a corn ration with insufficient exercise. Bumble foot, an infectious condition, predisposed to by bruising, can be allayed by minor surgery. Vent gleet is also infectious and affected birds should be isolated. Of all the local diseases of fowls, roup is the most destructive.

The most important contagious and infectious diseases of known etiology are cholera, fowl typhoid, tuberculosis and white diarrhea. Some of the more recent research work done in Germany by Manninger indicates that bacillary white diarrhea and fowl typhoid are related.

Tuberculosis is spreading to an alarming extent among our poultry folks. Its control calls for clinical diagnosis, tuberculin testing, elimination and disinfection.

White diarrhea originates in the ovary of the hen and it is transmitted through the egg to the baby chick and responds very slightly to treatment. It is the belief of the writer, after many years' experience, that some good results are obtained by using internal antiseptics in the first drinking water the chicks receive.

The general opinion of proper treatment of bacillary white diarrhea is by elimination carried on by the use of the pullorin test or preferably the agglutination blood test. In my experience recently—the Mediterranean breeds show less infection than the Asiatic strains and that about 10% of the flock are free from bacillary white diarrhea, while the remaining 90% have given reactions ranging from 1 to 40% with a general average of about 12% reactors. It is also noted that the flocks showing the greatest number of reactors are found under insanitary conditions. In fact, all flocks showing no reactors are found to be kept under clean and sanitary conditions and are small in numbers.

Questions on Poultry Practice

WILL you please advise me how to use nicotin sulphate as a vermifuge in poultry, or advise some other good remedy?

Will you please advise me how to make up an efficacious louse oil for poultry, to be applied with spring bottom can. Also to large animals (cattle)?

What would it cost me to have a sample of louse oil chemically analyzed?

What is the cause of a condition in poultry that sneeze most of the time, but otherwise seem to be healthy, and what would be the treatment (usually about 5% of the flock are affected, sometimes less)?

What would you advise doing with a flock of chickens where a few are affected with leg weakness, and otherwise seem to be healthy?

What is the best way to prevent coccidiosis in chickens, and also what is the best treatment?—J. E., Wisconsin.

Reply: To take up your queries in order:

No. 1. The best way to give nicotin to a flock of chickens for the eradication of round worms, is to administer it in the form of tobacco dust, using two pounds of good quality tobacco dust to 100 pounds of mash. This to be kept before the birds at all times for a period of one month. At the end of this time, administer one heaping tablespoonful of epsom salts, dissolved in their drinking water to each 12 adult birds. Iodin vermicid which is an iodin emulsion originally produced by Chandler, is very effective for eradicating round and tapeworms. In fact, it is one of the very best. Keeping up the resistance of the fowl by good hygiene and sanitation, which includes proper care, feeding, housing, cleanliness, etc., aids materially in keeping parasites in check.

No. 2. The most practical method I have seen tried, recently, for the eradication of lice on poultry is to paint the perch poles with black leaf 40, allow them to dry before birds go to roost. This method is very effective, but has to be seen to be believed. I was in doubt when this agent was first called to my attention, but after giving it a fair trial, I was forced to see the value of it.

The effectiveness of black leaf 40 can be demonstrated by placing a bird in a coop with wire bottom, elevating the coop and placing a piece of white paper underneath the floor. Then paint a perch pole with the black leaf 40 and place a bird infected with lice upon this pole. In 30 minutes or less the effects will be noticed.

No. 3. In cases of the chickens sneezing, it would be necessary to first find out the cause and remove it. Irritants such as dust, powdered drugs, strong fumes, filth, lack of sunshine and drafts in the house are among the many things that might cause the trouble. In case the birds were not getting enough sunlight, which is frequently the case especially in cold climates, during the winter, I would advise cod liver oil, using one quart to each 100 pounds of mash. See that the cod liver oil is put in fresh and do not depend upon the oil that is already in commercial mashes. A good grade of cod liver oil should be used.

No. 4. I would advise that cod liver oil be fed in the mash as in No. 3, and that the mineral supply be investigated. It is impossible to say specifically what the trouble is but lack of sunlight, green food and minerals is often the cause of such conditions developing, especially in winter. It would at least be well to try the cod liver oil and mineral if you are not already doing so. It might be well to have the affected birds examined for coccidia.

No. 5. There is no specific way in which coccidiosis can be prevented, and I am sorry to say that there is no satisfactory treatment known. Keeping up

the general health of the flock by proper breeding, feeding, housing, sanitation, avoiding chilling, overheating and crowding will go a long way toward preventing the trouble. As to treatment, cleanliness, good diet (not too rich), disinfection and other regulations that might need attention and the feeding of buttermilk is about all that can be offered you. —F. D. Patterson, Jr.

POISON DARNEL

Elston W. Chapin of Tripoli, Iowa, writes as follows: "I am sending a sample of a plant that has shown up in the oats on a few farms. It has come in for the first time in some fields even where the farmer has used his own oats for seed. One neighbor says he has had it for a few years. Will you kindly send me, in the addressed envelope enclosed, its name, habits, and what would be of interest to the farmers as to its seriousness? We have not found any in our oat fields and we have bought all of our seed."

This is one of the many letters I have received during the last few years concerning darnel. The darnel grass is fairly common in many parts of the state. Darnel, known as *Lolium temulentum* to botanists, is an annual, or in milder climates a winter annual. It is a grass closely resembling the perennial and the Italian rye grasses. The stems are smooth and stout, with spikes 6 to 12 inches long. This grass has long been suspected of being poisonous. The ancients so regarded it and it has been commonly regarded as such in Europe.

It was the grass about which was written in the Bible, "But while men slept his enemies came and sowed tares among the wheat."

Darnel, when ground up with wheat and made into flour, is said to produce poisonous effects on the system, such as headaches and drowsiness, and it is a poisonous narcotic principle in the seed which causes eruptions, trembling, and confusion of sight in man and flesh-eating animals, especially in rabbits. It apparently does not affect swine, horned cattle, or ducks.

Ames, Iowa. L. H. Pammel.

NEURO-PARALYSIS A SEQUEL OF ANTIRABIC TREATMENT

There has been considerable discussion among medical men relative to a paralytic condition that is occasionally associated with or follows the administration of antirabic treatment in the human. A report of this condition was published in the *Annals* of *Tropical Medicine* and *Parasitology* by Stuart and KriKorian of the Department of Health of Palestine. The following is an excerpt of that report.

It is possible that a small percentage of nonfatal cases of apparent paralysis following the antirabic treatment are pseudo-rabies, but fatal nonrabic cases do occur. At the first Rabies Conference of the League of Nations in 1927, 329 paralytic cases had occurred in 1,164,264 patients that had been treated with antirabic vaccine.

This condition is apparently more common in adults than in children, in males than in females, and there is a preponderance of such cases in those engaged in intellectual pursuits such as teachers, bookkeepers, etc.

It has been quite conclusively demonstrated that the cause of this type of paralysis is contained in the vaccine, and although adversely affected by various physical and chemical agencies is still capable of producing neuropathic paralysis in certain individuals.

Post antirabic treatment paralysis is not an anaphylactic shock. This condition is not due to the rabies virus, or toxin as it can be produced by the inoculation of normal brain substance. The quality of brain substance or antirabic vaccine inoculated is apparently not a factor in the occurrence of this neuro-paralytic disorder, therefore the dosage of antirabic vaccine as a factor in the occurrence of this condition is eliminated. The proper treatment of antirabic vaccine with phenol will reduce the occurrence of neuro-paralytic disorder to a minimum.—A. T. K.

Tricks of the Nostrum Makers*

By J. H. WEINER, Kansas City, Missouri

RELENTLESS, all demanding, ever vigilant day and night, this army of disreputable manufacturers move an endless stream of spurious products through their innumerable, nondescript, makeshift, so-called laboratories and out into the highways and byways of veterinary commerce, foisting upon the incredulous farmer and the unsuspecting veterinarian, chance creations of super-imaginative minds, with no reference to therapeutic activity or to compatibility of formulae. Their advertising methods and copy are most nefarious and their exaggerating ambassadors with their glib tongues deceive the gullible farmer.

Just recently I read a farm journal editorial pleading for an even break for the farmer—for the relief of the farmer. Further on in the same issue appeared a full page advertisement of a nostrum, a shameful fraud and from their editorial I judged the owners of the journal must be carrying this advertisement to relieve the farmer—of his money.

Most of you have not the remotest idea of the inner workings of nostrum manufacturing. You, in your wildest imaginations, can never grasp the enormity of their profits. The worthlessness of their products is beyond all conception. They are indeed, gentlemen, the get-rich-quick Wallingfords of veterinary commerce.

I am here, gentlemen, in the second of a series of nostrum talks to acquaint you with this situation. I have no selfish motive and represent no particular organization, but come here imbued with the spirit of uplift for your illustrious profession.

Let us first take up nostrums for the cure of necrotic enteritis. What an avalanche of purported cures! What an army of therapeutic inactivity!

Our laboratory has analyzed over thirty supposed necro-cures, and the amount of water ranged from 83% to 99.8%. What a drain on the country's water supply! There are among this class of so-called medicines, one or two that stand out most glaringly. The one I first have in mind is manufactured in the middle west by a firm that have or had up to a few weeks ago, a graduate veterinarian in their employ who was a bit careless with his ethics. They have published an eighty page encyclopedia, showing that their product is indicated in the treatment of everything from anaplasmosis to flexion crevices, from milk-fever to coccidiosis. It is recommended for every disease to which the animal flesh is heir. Do you believe it? I don't, and when I tell you what is in this preparation you won't either.

On the basis of dilution as contained in their directions, the analysis is as follows:

Creosote, 1/120th of 1%.
Calcium, Phosphate, 1/24th of 1%.
Sodium Hydrate, 1/60th of 1%.
F. E. nux vomica, F. E. licorice, potassium iodid and Wormseed, 1/20th of a trace, which in other words would mean 1/1200th of 1%.
Water, 99%.

Gentlemen, in your wildest fancy do you think this will cure anything? And yet they carry copy in a farm journal showing a large hog raiser making the statement that this so-called remedy put three hundred pounds apiece on 7,500 head of hogs in five months. Gentlemen, this hog raiser must have weighed these hogs with a barrel of this remedy tied on their backs.

This product costs 22 cents a gallon to manufacture. The bottle costs one cent more or 23c, making 45 cents in all, and they do the farmer a favor and sell it to him for $10.00 a gallon. What great philanthrophy! What farmer relief!

Here is another one that is equally as good. Diluted according to directions it would contain as follows:

Sodium Hydroxid .....1/70th of 1%
Turpentine .....1/4th of 1%
Tar .....1/60th of 1%
Water 99.98%

However, these folks were a little more religious, and only charged $9.00 a gallon.

* Presented at the 41st annual meeting of the Iowa Veterinary Medical Association, Des Moines, Jan. 22-25, 1929.

If their products cost a cent more than 35 cents a gallon to produce, I miss my guess. Do you think that this concoction will cure anything! I say "no," and you gentlemen say "no" also. And so on down the line—water—water—water!

Gentlemen, it is quite an accepted fact among veterinarians that alkalinization tends to relieve so-called necrotic enteritis and that there should be at least 10% of alkaline materials in the undiluted solution, yet these folks have not the common decency to put a therapeutic dose that costs very little into their products and if they do, they add other things to the formula which inter-act with the alkali and bring its strength down to nothing.

There is also a great danger in certain of these products. When F. E. Nux Vomica is used in the presence of sodium hydroxid or phosphate, the strychnin is precipitated and becomes insoluble, and might, if the package is not properly shaken before use, become toxic. Gentlemen, isn't a condition like this shameful? Shouldn't we help to stamp it out?

Next to supposed cures for necrotic enteritis the most fertile field lies in worm remedies. Emperor Nero in his palmiest days never fiddled his violin any faster than these manufacturers fiddled out these worthless nostrums. Even the ingredients used while they are not even indicated, are of the most technical nature, some even producing toxic after effects. Talk about your shotgun prescription. Here is a veritable hotbed of them; each manufacturer trying to outdo the other.

One manufacturer coats his product with some preparation that in the laboratory we have been unable to dissolve in any ordinary solvent, nor have we been able to break off this coating by any ordinary means. The only way that capsule will get the worms will be to tickle them to death while passing through.

The analysis of this capsule showed it contained pyrethrum, kamala and tobacco, all in doses far below the therapeutic standard. If you do not know it, let me tell you that kamala powder with an ash over 5% is practically devoid of anthelmintic properties and yet not a single one of the manufacturers products we analyzed contained kamala with an ash content under 8%.

Santonin as a vermifuge fills a great gap, but if you use it, buy it from reputable manufacturers. I can show you samples of capsules and tablets we have investigated that contain only 0.3 gr. and not a single one contained over 1 gr. of Santonin, and you know, gentlemen, 2½ grains should be the minimum dose And what a preponderance of worm oils—none of them containing a therapeutic dose. Here are some statistics:

Fifty one samples of worm oil supposed to contain oil of chenopodium give the following results:

11 less than 3 minims oil of wormseed.
36 less than 8 minims oil of wormseed.
5 less than 10 minims oil of wormseed.

None of them over 10 minims oil of wormseed to the ounce.

As for worm powders, these manufacturers have been diligent in their search for cheap, worthless ingredients to make bulk. Some of them have as many as twenty-one separate ingredients. The majority are of no value and what little value others have is rendered inert by being incompatible—a shameful condition.

I want to read a few lines of copy from a circular. We will call the name of this preparation "Fakon."

"'Fakon,' the only soluble organic sulphur, is the greatest blood purifier, antiseptic, tonic, growth promotive, disease preventative and control known to science. Fakon keeps the alimentary tract free from the bacteria and germs which attack this part of the pig, and the upbuilding of the body can go on interruptedly. Without Fakon, the germicidal agent in the destruction of harmful bacteria, the growth of the animal would be retarded, regardless of diet."

Gentlemen, aren't you ashamed of yourselves that you are not using Fakon? Here is what it cures: "pig scours, necrotic enteritis, necrobacillosis, hog cholera, swine plague, abortion. Rids hogs of worms, fattens them, grows them," and finally kills them, I imagine, from elephantiasis. This product it seems to me should have an antidote along with it to stop them from getting too fat.

Fakon is a product that if it is pure contains 25% ammonia, 8% of ammonium sul-

phate, and 10% of total sulphur. It belongs to a group of tarry preparations obtained by sulphonating bituminous shale. It is imitation ichthyol of a very impure type. Its antiseptic effect is nil. It will not destroy any of the members of the colon bacilli; neither will it inhibit staphylococcus growth. Its value is no greater than the ingredients it contains and in the conditions it is recommended for, this value is nothing. Yet when you read their circular you wonder how the animal kingdom has ever thrived up to now without this sterling, most necessary, vitally important—fraud.

Roup powder, roup tablets, roup emulsions, roup liquid, and roup this and roup that seems to be another source of revenue for unscrupulous manufacturers. I know a fellow, in the city I came from, that has been selling roup remedy that contains 0.5% potassium permanganate and 99.5% water, colored water I would call it. He gets a dollar for four ounces. It costs him but 4c. Listen to what he tells you about his products and then let me ask you, gentlemen, if you do not think now is the time for us to carry on an educational campaign against these vicious evils. Here it is:

"Stops roup and cold overnight. Ends wheezing and choking and running at the nose in twenty-four hours. Used by biggest poultry raisers for over 20 years with the most amazing results. Developed after years of research by a well known chemist."

What lying piffle! This baseless material will not cure roup in 24 years; much less 24 hours. This firm has been in business only two years. How could they have been selling it for over twenty years? If it took years of research to develop this preparation, the education of this pseudo research chemist must surely have been sadly neglected

Here is another: We made the analysis of a tablet intended for the cure of roup that is manufactured in a state bordering Iowa. The veterinarian sending in these tablets for analysis wrote the following letter:

"A good many of the farmers in my community have been stung by a salesman for the ——— Medicine Company, and bought these tablets with a guarantee. They were valueless. One of my clients wrote for his money back and this firm told him that he did not follow directions or else he would have gotten results. I wish you would analyze these tablets and let me know what you think of them."

Here is the answer:

"We beg to submit the following report of the analysis of Doctor ———'s Roup Tablets:

Potassium permanganate..62/100th of 1%
Sugar 93%
Borax 6%

The directions advise that this tablet be dissolved in one quart of water. The diluted solution would then have the following formula:

Potassium permanganate....1/7000 of 1%
Sugar .....1/3 of 1%
Borax .....1/500 of 1%

A mixture of this sort is absolutely valueless for the purpose intended."

What a crime! Pure ordinary swindle! And yet these fellows have the temerity to make these fraudulent claims and poultry magazines have the audacity to distribute them.

You have all heard of gold bricks and probably some of you gentlemen have purchased them. I have. Well, we have among nostrum manufacturers men who sell you medicine bricks at enormous profits. One fellow in your state (Iowa) makes one of these bricks. Upon analysis we found in his brick, salt 98.5%, Nux vomica 0.5%, iron sulphate 1%. He sells this for just exactly 55 times what it costs him. And yet this firm, upstanding gentleman will show testimonials that this brick is a cure-all. Can you beat it? and what a deluge of bricks, each one more spurious than the other, each one pouring gold into the manufacturer's pocket and only grief for the farmer.

No talk on nostrums is complete unless we devote some time to purported coccidiosis remedies, the manufacturer of which is quite widespread. From time immemorial research investigators have been looking for a specific for the cure of coccidiosis, but as yet we have not met with much evident success. The laboratory I represent is spending a good deal of money for research along these lines, and I only hope it falls to my lot to benefit veterinary medicine by the finding the cure.

However, nostrum manufacturers have found hundreds of cure-alls, backed by testimonials, of users who upon investigation were found not even to exist. In two instances the persons whose names were used as endorsers had been dead for over five

years. I expect these manufacturers were in spiritual contact with them. Two of the most glaring frauds labelled coccidiosis cures come to my mind. One is a tablet. The directions are to dissolve one of these tablets in a gallon of water and feed constantly. This tablet was so hard it took over 24 hours to dissolve it and then we had to use hot water. It was a secret treatment and we started out to find the secret. Here it is:

Creosote	0.1%
Salt	99.9%

In dilution the creosote would be present to the extent of 1/60,000 of 1% and salt 1/60th of 1%, which expressed in every day garden variety English means nothing else than water.

Yet these manufacturers were quite disturbed when they found out we were investigating their fraud and threatened to sue me personally, saying no chemist could analyze their product. It defied analysis. I expect they dared us to find out what was in it. They were right. There was nothing.

One dollar for fifty tablets. They cost 13c per 1000 and eleven of that thirteen cents is what it cost to run the machines, leaving two cents for the material. Laugh that off!

Gentlemen, the other preparation was a liquid colored a passionate pink and very handsomely labelled. It was made not far from here. They claimed that they had found the cause of coccidiosis and then found the cure. Ninety-eight per cent of that cure came out of a bright shiny faucet.

The other two per cent was technical tannic acid. Their directions called for a dilution of one ounce to a gallon. The percentage of tannic acid in the diluted material would then be 1/56th of 1%, and that's the stuff that got the elusive coccidia. Do you believe it? Well, these folks will prove it to you for a dollar. Two cents for the medicine and ninety-eight cents for the proof.

Now, gentlemen, don't you think it is your duty to carry on? Don't you think that we ought to have some concerted means of getting this information to the farmer—your client?

BITTER MILK CAUSED BY SNEEZEWEED

George Sims, Morocco, Indiana, writes as follows:

"F. C. Hamilton of Purdue was here testing for T. B. I told him about our Jersey cow. He suggested I write you, and am enclosing some leaves that seem to be the cause of the trouble. Twice this fall the milk would become strong in taste and odor, then it would become stringy. We finally found it was something she was getting in chicken lot. That was walnut leaves, perhaps. Have now found that it is the leaf of a cherry. This tree was supposed to be an extra white sweet cherry, but the fruit is always bitter and like a quince. Every time she can she runs to this tree and eats the leaves with as much relish as she would green corn. We are feeding her alfalfa hay, corn shucks, chow chow, ground oats, corn and bran mixed. What is she lacking?"

The specimen proves to be a form of the common cherry (*Prunus avium*). I am not an authority on the subject of rations, but Prof. C. A. Mathews states that if fed in the right proportions, the feed given her is all right. Prof. Mathews states that sometimes during the end of lactation, cows give bitter milk, which may be due to some extra amount of lipase secreted in the milk. This can be remedied by heating the milk to 160 deg. F. for a few minutes.

Of course, cherries all contain Prussic acid, especially the cherry bark, and sometimes the bark has considerable tannin. Probably there are also other principles in the old leaves. Some animals have an inordinate desire to get something that is pungent. Thus, for instance, certain animals will bark trees of the oak, to get the tannic acid. Prussic acid is very toxic, but I do not think that it alone can cause the bitter milk. I wonder if it is possible that she may have access to sneezeweed, which imparts a bitter quality to milk. This is also true of several other plants of the same family. Sometimes bitter milk is caused by germs that get into the milk.

Ames, Iowa. L. H. Pammel.

STRANGULATED SCROTAL HERNIA IN A STALLION*

This is the case of a black Percheron stallion. The animal was about twelve years old, in good condition and had been on a regular stand. Early in this particular morning he had been used for service, and about ten o'clock became sick with colicky pains. The stallion was dosed with home remedies until about three in the afternoon, when the writer was called and diagnosed a strangulated inguinal hernia.

One side of the scrotum was enlarged and rather tense, the pulse greatly accelerated and becoming rather weak, and the patient was suffering intensely.

The horse being rather old and not especially valuable it was decided to remove both testicles if a reduction of the hernia could not be effected otherwise. The patient was cast in the usual manner for cryptorchid castration, the parts prepared and the portion of the intestine involved in the hernia was tapped with a hypodermic needle. This made it possible to remove a great deal of the gas and fluid from the ensnared gut and was done in order that it might be more readily reducible. Then with my hand in the rectum I grasped the strangulated portion of the intestine and, with the help of an assistant, who massaged and manipulated the scrotum, I was able to reduce the hernia in a very short time. It is now some six months after the operation and the animal is reported to be doing fine.

I think this condition is generally recognized as a commonly fatal one or one which requires the removal of one or both testicles, which in a valuable horse is not a very satisfactory outcome from the owner's standpoint. I have operated or helped operate on several cases in the past and on one occasion succeeded in cutting the inguinal ring, replacing the intestine and suturing the ring. However, the scrotum on the affected side remained permanently enlarged and edematous. Although the operation saved the life of the patient it could not be called a successful operation, and because it is so complicated is not very practical in many cases.

The aforedescribed procedure is not difficult and because of its simplicity can be carried out under nearly all conditions. While it may not be new to many of you, it was the first time I had ever tried it, and I thought it might be of interest and help to many.

H. B. Treman.

Rockwell City, Iowa.

* Presented at the 41st annual meeting of the Iowa Veterinary Medical Association, Des Moines, Iowa, Jan. 22-25, 1929.

STERILITY IN A HEREFORD HERD

I have a condition in cattle that I should like some suggestions on. I was accosted on the street some two weeks ago by a client, with this history of a Hereford herd.

An abortion fifteen months ago was the first thing noticed that was abnormal. Spring approached and passed with no calves and cows in heat and bull serving them regularly and continued until July. At this time, he bought a five-year-old Shorthorn bull and put with them. In addition, a young bull of his own rearing arrived at breeding age and he served several cows and still a number of them come in heat, but some appear now to be with calf.

There are 30 cows in this herd. I drew blood from four for the agglutination test and it was reported negative. I told my client it hardly seemed to be infectious abortion as there was not enough history of abortions.

He showed me one cow's tail that was smeared somewhat by a discharge and said he had noticed some with a bloody discharge a few days before coming in heat. The heat periods come fairly regularly and are of proper length.

Any suggestions will be appreciated both as to diagnosis and treatment.—*F. H. B., Kentucky.*

Reply: This reads more like a local infection than aborption disease. I recall a condition like this that I treated some ten years ago. The early history was just about as indefinite as this man gives, i. e., the

animals were coming in heat more or less regularly but none of them conceiving. They, too, had two bulls, an older one and a younger one and, after a time, it was found the cows had profuse yellowish discharge a day or so after having been bred.

I was asked to see this herd, although their veterinarian and herdsman had been writing me for some time. Upon examination, I found the old bull had frightfully diseased seminal vesicles, so bad, in fact, that I did not think him worth treating and so had him slaughtered. We then douched everything of breeding age in the herd daily with our douching powder, using good hot water, around 112-115°F. and a stomach pump and tube to throw it in with good force. I also took some of the discharges incubated them so as to make an autogenous bacterin. This, as you know, takes about a week and by that time about half of them were apparently all right. As I recall it, there were about thirty in all affected and there were three of them that hung on awhile so we did use the bacterin on these. We cleaned everything up absolutely. Our douching powder is made of, potassium permangenate. It is stated in the inquiry that one of the cow's tail was smeared somewhat by a discharge. If there is a slight infection, that may be so. I have seen this kind of infection where there would be scarcely any discharge in evidence until you made an examination of the vagina. However, in others the discharge is so profuse that some cows will pass from a pint to a quart a day.—*J. F. DeVine.*

CALF DIPHTHERIA

Calf diphtheria has occurred in various locations during the last twenty-five years. A rather serious outbreak occurred in the region of El Paso, Texas, in 1904. Enzootics in small herds have been observed in many dairy sections. Recently this malady occurred in Wyoming. Unless the affected animals are promptly treated, death results. Calf diphtheria is caused by the *B. necrophorus* and in the early stages responds readily to local treatment.

COMPARATIVE EFFICIENCY OF ANTHELMINTICS[1]

The authors studied the therapeutic effect of anthelmintics on helminths: *Taenia serrata, Dyplidiuf canium, Gigantorhynchus hirudinaceus, Ascaris lumbricoides* of swine and *Ankylostomum brasilieuse* of the dog and report the effect of the different drugs used on the different species of parasites. *T. serrata* and *Dipl. canium* showed identical susceptibility to anthelmintics.

In the following table, O indicates ineffective; + slightly effective; ++ more effective; +++ fairly satisfactory, and ++++ practically 100% efficient against the parasite.

Anthelmintics	Cestodes	Ascaris	Anteylostoma
Koresso (infusion)	++++	0	0
Kamula (infusion)	++++	0	0
Male Shield Fern (infusion)	++++	0	0
Mail Shield Ethereal Extract	++++	0	0
Oil of Filmaron	++++	0	0
Pommegranate decoction	++	0	0
Pelletierine	++	0	0
Pseudo-Pelletierine	0	0	0
Arecoline	+	+	++
Oil of Chenopodium	++++	++++	++
Thymol	++++	++++	++++
Beta-Naphtol	++++	++++	++++
Carbon tetrachlorid	++++	++	++++
Santonin	+	+++	++
Allyl Sulfide (Garlic oil)	+	+++	0
Pyridine	0	++++	+
Nicotin	0	++++	+

It has been known from time immemorial that the different species of intestinal parasites vary greatly in their susceptibility to certain anthelmintics. The best results can be obtained only when the remedies that are the most appropriate against certain parasites are judiciously selected.

Fish meal has been found by the New Hampshire Experiment Station to have definite antirachitic properties when incorporated in feed for swine.

[1] Action of Anthelmintics on Cestodes, Ascarides and Ante lostoma, by Rebello, Gomez and Rico; Compte Rendu, Societe de Biologie (Portugese Section), February 6, 1928, Vcl. 98, page 995; translated by C. H. Schultz, Chicago.

VETERINARY COLLEGE SEMI-CENTENNIAL

The Veterinary Division of the Iowa State College at Ames will complete 50 years of operation as a veterinary college with the present session; the school having been established in 1879.

Exercises in commemoration of the founding of the school will be held before the close of the present session and Dean Stange plans to issue a booklet at that time outlining the principal achievements of the school and developments in veterinary science during the past 50 years. Dean Stange will complete his twentieth year as head of the institution with the close of the school's fiftieth year of operation.

The large enrollment in the Iowa Veterinary School last fall has made necessary an action to prevent future classes from becoming too large—a problem that has given no veterinary college any concern during the past decade. Beginning with the fall quarter of 1929, freshman enrollment will be limited to sixty. That number can be accommodated with the present buildings and equipment and satisfactory work done.

UNDULANT FEVER AND TULAREMIA

The conquest of the world's latest threatening disease, undulant fever, is causing heavy casualties among the scientists who are engaged in the fight. While the disease is not often fatal, it is highly infectious and almost all the men and women who have been studying it have acquired it, in spite of every precaution. In this respect undulant fever is like tularemia, another comparatively new disease. These two are causing grave concern in public health circles because of their rapid and wide spread during the last few years. Tularemia, besides being very infectious, also results in death in many cases.

In this country four scientists of the U. S. Public Health Service have suffered from undulant fever, the latest one attacked being Dr. Edward Francis, who also acquired tularemia when he was investigating that disease. He had recovered, however, from tularemia before the attack of undulant fever. Of the others attacked by undulant fever, one, B. T. Stockrider, a laboratory technician, has entirely recovered. The other two, Miss Alice Evans and Dr. G. C. Lake, have recovered sufficiently to resume their work, but they have not yet regained health entirely, and are still subject to return attacks of the disease. It is these recurring attacks after periods of apparent recovery which give the disease its name of undulant fever.

Tularemia always attacked the laboratory workers during the first work done on it. All six of the men who studied it for the U. S. Public Health Service acquired it, some of them had it twice. The same thing has been observed in other countries. The Lister Institute of London recently asked the Public Health Service for cultures of the organism causing tularemia, so that their scientists could study the disease. When the cultures were sent, warning was also sent that it must be handled with extraordinary care. In spite of this, one of the workers at the institute acquired the disease. Knowledge gained in the study of the disease has now taught the investigators how to handle it safely.

ANTIRACHITIC FOODS

"Synthetic cod-liver oil," stuff that builds bones and prevents the childhood disease of rickets without the unpleasant taste of the fish oil, was recognized when the 1928 Nobel prize for chemistry was awarded to Dr. Adolf Windaus, of Göttingen, Germany. This is the first time that the Nobel Prize Committee has recognized any of the scientific work done on the problems of human nutrition.

A scientific controversy may arise from this Nobel prize award since priority honors and patent rights are involved in the situation. The work along these lines began when Dr. E. V. McCollum and his associates at the Johns Hopkins University found that a substance, known as vitamin D and found in cod-liver oil and to a lesser extent in other fats, has the power of preventing rickets. These scientists also were the first to find that irradiating animals by exposing them to ultra-violet rays would keep the animals from having rickets even if the antirachitic vitamin D was not in their diet.

The next step was taken by Professor Harry Steenbock, of the University of Wisconsin, who instead of irradiating animals tried irradiating their food. He worked with a mixture of foods and found that irradiation gave to the foods the antirachitic power. Commercial production of irradiated foods is now in progress under the Steenbock patent. Dr. Alfred E. Hess, of Columbia University, irradiated the different classes of foods separately and found that the antirachitic substance was contained in fats. He and every one else believed for some time that it was the cholesterol of fats that was the antirachitic substance.

Then in July, 1926, Dr. Barger and his associates in England announced that pure cholesterol can not be activated by ultra-violet rays, but that irradiation does activate ergosterol which is found as an impurity in ordinary cholesterol not purified by a special process. They believed ergosterol had the antirachitic property. Dr. Windaus repeated their experiments, and again tested cholesterol which had been specially purified. He proved definitely that it is ergosterol and not cholesterol which is activated by exposure to ultra-violet light. Dr. Barger and his associate, Dr. T. A. Webster, have also proved by experiments with animals that this activated ergosterol can prevent rickets.

CASTRATING AND DOCKING LAMBS

Because lambs which have been castrated and docked are better developed and are more uniform and attractive on the market than other lambs, the United States Department of Agriculture is urging a more general adoption of these practices. The fact that the largest part of the return from farm flocks is derived from the sale of lambs makes it desirable to have the lambs in the best possible marketable condition.

MINNESOTA LOSES FOUR PROMINENT VETERINARIANS BY DEATH

The Minnesota Veterinary Medical Society, at its thirty-second anunal meeting in Minneapolis, January 24-25, 1929, adopted resolutions of condolence on the death of four of its leading members.

M. H. Reynolds, St. Paul, a nationally known veterinarian for a generation and connected with the University of Minnesota for 35 years; L. Hay, Faribault, for many years prominent in the state association; J. P. Anderson, Rochester, a charter member and past president of the state association; and Roy Becker, LeRoy, Minn.

CHANGES IN ARMY VETERINARY SERVICE

Regular Army

Captain Gerald W. FitzGerald, V. C., is relieved from duty at the Kansas State Agricultural College, Manhattan, Kans., on or about June 1, 1929, and directed to report to the commandant Army Veterinary School, Army Medical Center, for duty. The name of Captain FitzGerald is removed from the detached officers' list, effective upon relief from his present duty.

Captain Harry E. Van Tuyl, V. C., is relieved from duty at the Presidio of Monterey, California, to take effect on or about May 15, 1929, and is detailed to the Kansas State Agricultural College for duty, and on the same date transferred to the detached officers' list.

1st Lieutenant Verne C. Hill, V. C., is relieved from duty at Camp Marfa, Texas, and directed to sail on transport leaving San Francisco on or about March 9, 1929, for duty in the Philippine Islands.

Major Clifford C. Whitney, V. C., is relieved from duty at Fort Robinson, Nebr., and directed to sail on transport leaving San Francisco on or about May 25, 1929, for duty in the Philippine Islands.

Each of the following-named officers is assigned to duty at the station indicated after his name, effective upon completion of his present tour of foreign service:

Major Harold E. Egan—Fort Ethan Allen, Vt.

1st Lieut. L. E. Schweizer—Camp Marfa, Texas.

Colonel Robert Vans Agnew, V. C., Fort Oglethorpe, Ga., is directed to proceed to his home February 5, 1929, and await retirement.

Each of the following-named officers of the Veterinary Corps is relieved from further assignment and duty at the Army Veterinary School, Army Medical Center, Washington, D. C., and from temporary duty at the Medical Field Service School, Carlisle Barracks, effective upon completion of present course of instruction on or about May 31, 1929, and will proceed to the station specified and report in person to the commanding officer thereof for duty:

Captain George L. Caldwell—Fort Oglethope, Ga.

Captain Edwin K. Rogers—Fort McIntosh, Texas.

2nd Lieut. John L. Owens—Fort Sam Houston, Tex.

2nd Lieut. Maurice W. Hale—Fort Sam Houston, Tex.

2nd Lieut. Charles S. Greer—Fort Bliss, Tex.

Captain Philip H. Riedel—Army Veterinary School, Washington, D. C.

Captain Peter T. Carpenter—Veterinary Dispensary, Washington, D. C.

Captain Fred C. Waters—Presidio of Monterey, Calif.

Reserve Corps

Promotions:

Magens, Hans J., 1st Lieut. P. O. Box 700, Fredericksburg, Tex.

Steibing, Cl. C., 1st Lieut. 421 Collins Ave., Baltimore, Md.

THE OHIO STATE VETERINARY CONFERENCE

The fourth annual veterinary conference of the College of Veterinary Medicine, The Ohio State University, will be held March 20, 21, 22, 1929. This year it is proposed to extend the program to include not only sessions in veterinary art but actual laboratory courses in serology and parasitology. The sessions in veterinary art will be held each evening of the conference and the discussions will consist in the main on subjects presented during that day. At these sessions the practitioner will have ample opportunity to have his questions discussed by leaders in the profession. Leaders have been chosen for these sessions, to bring out, as far as possible, the latest and best in veterinary practice and to do so from the angle of the busy practitioner. These discussions will give the man in the field something he can take home with him and use in his practice for the benefit of the live stock owners of the community.

The laboratory courses will be given concurrently so that the practitioner must select the one he is most interested in. It is arranged so that those selecting a laboratory course can attend the general sessions of the conference during the afternoon and evening.

The course in serology will consist of a brief discussion of the theoretical and practical application of the agglutination test with especial reference to the diagnosis of bacillary white diarrhea and infectious abortion. The course in parasitology will consider the more important parasites affecting the domestic animals and various diagnostic methods. There will be sufficient practical laboratory work in each of these courses to familiarize one with their application in a routine practice.

Through the conference the University hopes to reach the animal husbandry of the state, employing the veterinarian as its medium of communication. By this means the College of Veterinary Medicine extends its service to the live stock industry through the veterinary profession. Veterinarians of Ohio and neighboring states are invited to be present during the entire program.